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SANITARY ENGINEER

BER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Publication Office : TORONTO, JANUARY 1, 1915 No. 1

Season's Greetings

Happy New Year

Health, Success, Prosperity

We take this occasion to express to you our sincere thanks and appreciation of past favors and the hope that our efforts to please and satisfy you will have merited for us a continuance of your patronage.

The Standard Ideal Company Limited

General Offices and Factories, Port Hope, Canada

TORONTO	MONTREAL	WINNIPEG	VANCOUVER
King St. East	42-44 Beaver Hall Hill	76-82 Lombard St.	410 Carter Cotton Bldg.

Beaver Bran

Cast Iron Enameled Wa

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

Amherst Foundry Co., Limit

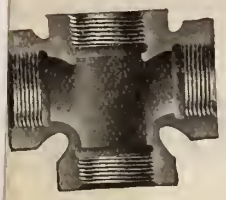
General Offices and Factory: Amherst, Nova Scotia

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co.,
178 Victoria St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes,
120 Lombard St., Winnipeg

BRITISH COL
A. O. Cam
864 Cambie St., V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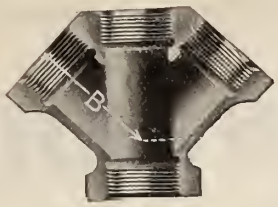

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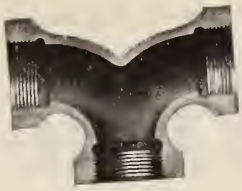
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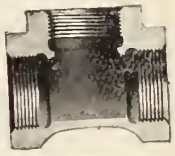
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Wishing the entire trade Happiness and Prosperity throughout the coming year.

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Fittings Limited
Oshawa

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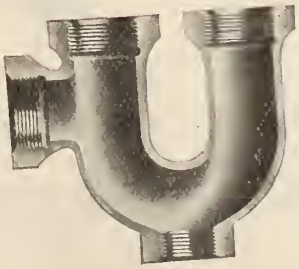
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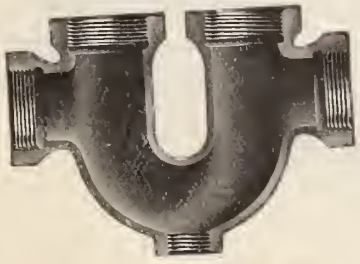
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War Time is a Good Tim

to look around and make **Comparisons** in the materi

You Use (Pay US a Visit)

DON'T FORGET

The price on the INVOICE is ALL a B-O-T o tfit cost you, as we live up to our 5-year guarantee to

Look for the Trade-Mark TRADE B.O.T. MARK

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B-O-T Building, 159-61 Richmond Street West, Toronto

Montreal Office:
68 Beaver Hall Hill

Vancouver Agents:
The Robertson-Godson Co.

Winnipeg Office:
J. H. Leonard
405 Tribune Building

TOLEDO AND JARDINE

PIPE THREADING TOOLS

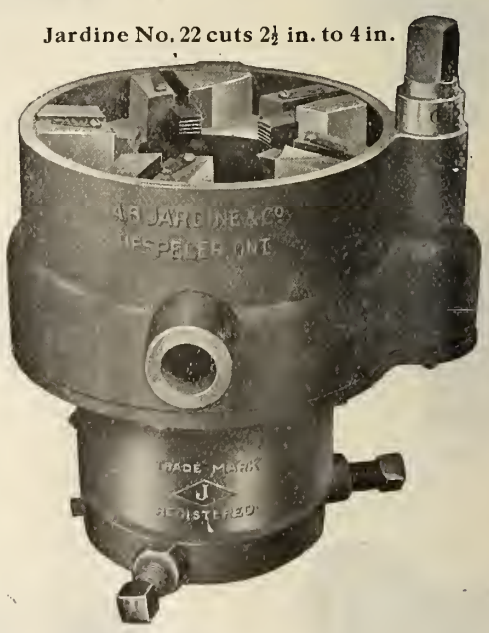
MADE IN CANADA

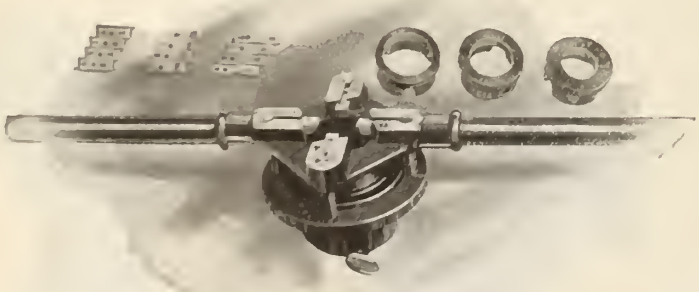
Your Jobber sells them

Perfect threads any size up to 12" finished at one cut by one man.

IT PAYS TO USE THE BEST TOOLS.

Jardine No. 22 cuts 2½ in. to 4 in.





Toledo No. 1 cuts 1 in. to 2 in.

Ask for our new Pipe Die Catalogue

A. B. JARDINE & CO.

Hespeler, Ontario

THE DAISY BOILER

Over 55,000 DAISY Boilers

[illegible]iving the best of [illegible]ce throughout [illegible]

[illegible]aisy has qualities [illegible]make it a better [illegible]osition than any other on the market.

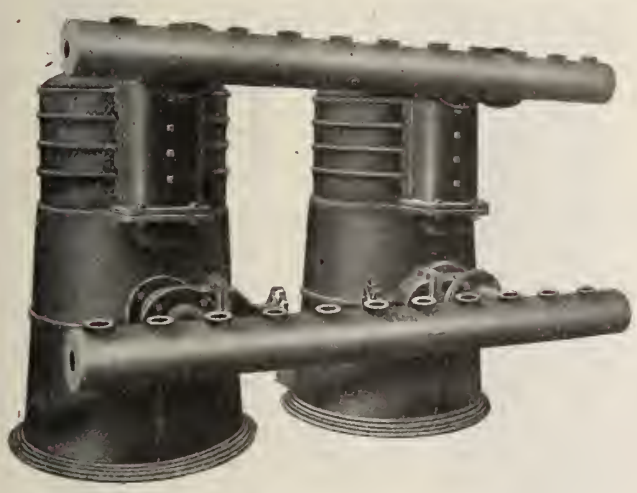
Made in the best equipped plant in Canada.

Without doubt the most popular boiler made.

Every installation means another customer satisfied.

Minimum consumption of fuel.

Maximum amount of heat.



Rear view of two Daisy Boilers connected with twin headers. This system gives great satisfaction in mild and extreme weather.

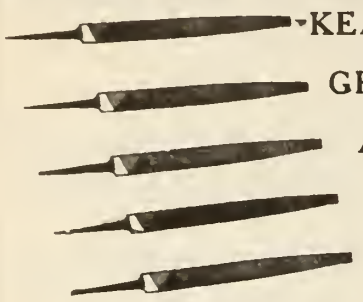
WARDEN KING LIMITED, MONTREAL

BRANCH, 200 Adelaide St. West, TORONTO

AGENTS:

The CRANE & ORDWAY CO., WINNIPEG, MAN.
The MECHANICS' SUPPLY CO., Limited, QUEBEC, P.Q.
The JAMES ROBERTSON CO., Limited, ST. JOHN, N.B.
The WM. STAIRS, SON & MORROW, Limited, HALIFAX, N.S.

Five Famous Files



KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(Made in Canada)

It takes the biggest part of a sixty million output yearly to meet the demand for these famous files.

Think of it!

The lion's share of Canada's file consumption supplied by these five brands. They cut deepest—last longest—cost least to use. Else why should the majority of file users prefer these Nicholson-Made-Files.

Throw away your half-worn files.

Use two files where you now use one.

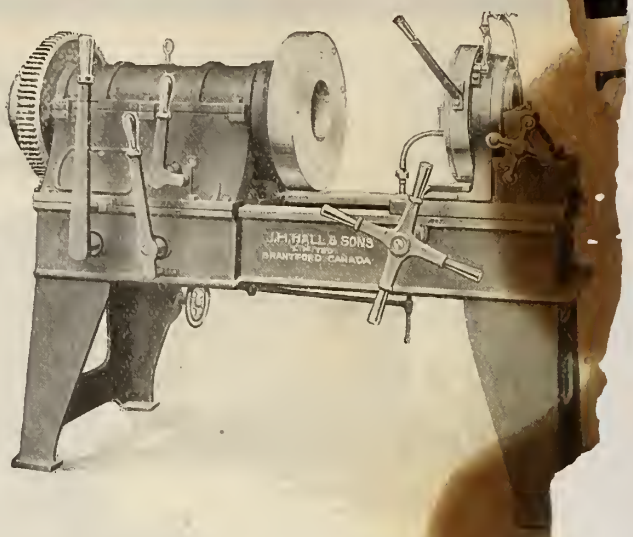
The saving in *time, labour, money* and *accuracy*, pays you a substantial profit over and above the first cost of files.

For more work and better work—for lower costs and larger profits—use more of the "Famous Five."

Nicholson File Company

Port Hope — *Dealers Everywhere* — Ontario

"FILE FILOSOPHY"—A little booklet every file user ought to read—sent free with our catalog on request.



[MADE IN CANADA]

THE HALL NO. 6 PIPE MA

When you buy Hall Machinery you kee employed. We are a Canadian firm, employing Canadian labor. Our guarantees are not at tance." We are at your door.

Our Machinery is the best that mechanical a produce and do not cost as much as imported ma

Write us for catalog and prices on pipe-threadi any capacity, from ⅛ to 18-in., also single and dou rapid nipple machines. No delays, delivery from s

JOHN H. HALL & SONS, Limited
BRANTFORD, CANADA

SOMETHING NEW

THE GEYSER AUTOMATIC WATER HEATER

is composed of a vertical cylinder from four to six feet long, according to size. The cylinder contains brass pipes which receive the steam and transmit heat to the water. These pipes are screwed to the base chamber, but remain independent from one another at the top, consequently, the expansion is entirely free, and leaks are impossible.

FULLY GUARANTEED
MANUFACTURED BY

THE E. S. MANNY CO.,
MONTREAL

R. E. Cleaton Co., 20 St. Nicholas Street, Montreal
Sales Agents

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

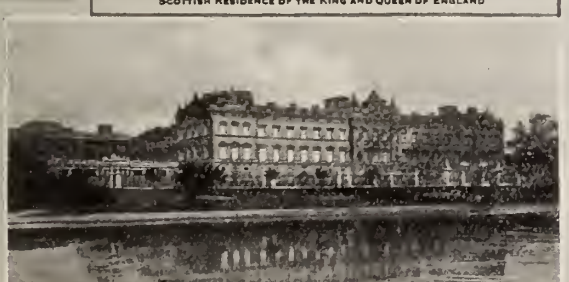
General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND

THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME



BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

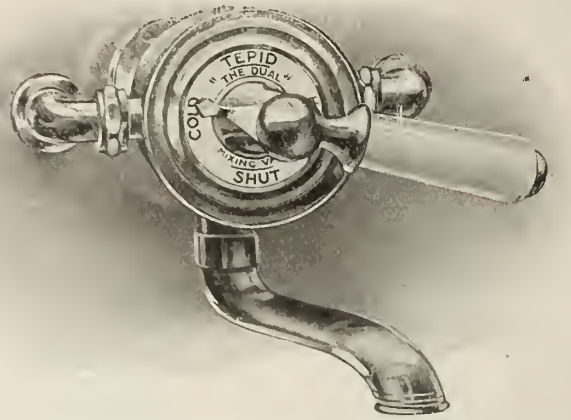
Messrs.
BRUNNER, MOND & Co., ENGLAND,
Have the finest Industrial Bath Installation in Europe.

OVER 2000 EMPLOYEES
are provided for.

This is the Valve used.

Made in England
by GUMMERS Ltd.,
ROTHERHAM

THE **DUAL** VALVE
IS THE FINEST MIXER YET PRODUCED



This Mixer is strong and well built.

It can be taken to pieces without disturbing connections. Made in various types for Baths, Lavatories, etc.; also special stock pattern with one or two outlets at option for making up sets.

Send for booklet to

Geo. Carpenter,
314 University St.,
Montreal
Canadian Agent

WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal

Talking to the Point—

CLASSIFIED ADS. get right down to the point at issue. If you want something, say so in a few well-chosen words. Readers like that sort of straight-from-the-shoulder-talk, and that is the reason why condensed ads. are so productive of the best kind of results.

CLASSIFIED ADS. are always noticed. They are read by wide-awake, intelligent dealers, who are on the lookout for favorable opportunities to fill their requirements.

TRY A CONDENSED AD. IN THIS PAPER.

J-M 45° Closet Bend for Durham system.

Larger Profits for You—Lasting Satisfaction for your Customers—when you install

J-M SANITARY CLOSET FITTINGS

Your estimate on the job need not be any lower than with the ordinary fittings; and as you can make closet connections with J-M Fittings in LESS THAN HALF THE TIME usually required, and use less lead, etc., there is more money in it for you.

There is also greater satisfaction on the part of your customers, as these fittings will last as long as the building and are guaranteed absolutely gas-tight when properly made up.

J-M Fittings are quickly and easily screwed or caulked into the stack, and can be turned to any angle desired. The ½-inch serrations (shown in cut) enable you to knock off the flanges on either end with hammer and chisel and adjust the ends very readily. This is an exclusive patented feature.

No test plug necessary, as we provide a special test plate—our exclusive feature. No lead used except in caulking—therefore no risk of oxidation in the concrete.

Write our nearest Branch for "J-M Sanitary Closet Fittings Booklet" and Special Proposition.

J-M 90° Closet Bend for soil pipe. Plain or tapped for iron pipe.

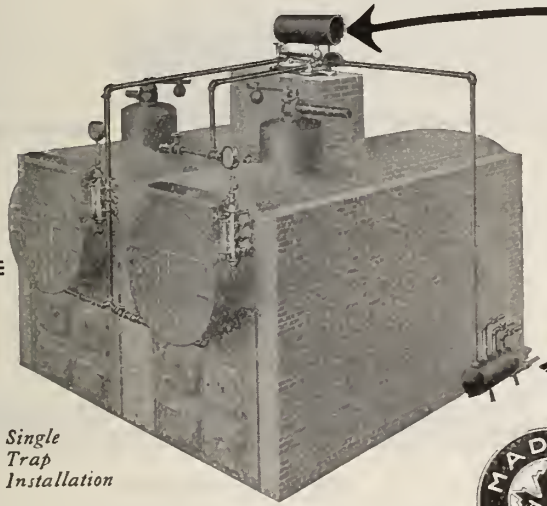
J-M Straight Connection for soil pipe.

THE CANADIAN
H. W. JOHNS-MANVILLE COMPANY, LIMITED

Manufacturers of Plumbing Fixtures; Closet Seats; Flush Valves; Washerless Faucets; Copper Floats; Pipe Coverings; Pipe Joint Cement; Joint Runners; Packings; Etc.

TORONTO MONTREAL WINNIPEG VANCOUVER

JOHNS-MANVILLE SERVICE COVERS THE CONTINENT



Single Trap Installation

Feeds Condensation direct to the Boiler at 330° Fahr.

MADE IN CANADA

205 deg. Fahr. is about the highest temperature at which the ordinary feed pump will handle water. The Morehead System drains the steam apparatus of **all** condensation and feeds it **direct** to the boilers at 100 to 150 degrees **higher** than the steam pump can, and on **90 per cent. less steam.**

Morehead
Back to Boiler SYSTEM

That's why such mammoth concerns as the Washburn Crosby Co., the Packard Motor Car Co., Yawman & Erbe, Sankey Bros., etc., have installed the Morehead System in their plants. It saves them many dollars every day besides doing away with endless trouble and repairs.

If you would like to become acquainted with a better method of handling condensation—investigate the Morehead System. Don't delay. Write us to-day.

Canadian Morehead Mfg. Co. Dept. "C" Woodstock, Ont.

It doesn't cost

us much more to make SYDENHAM BRAND goods than it does to make the cheaper kind, and it certainly pays to use them on every ob when the **best** is required and your **reputation** is to be maintained.

EVERY PIECE GUARANTEED

Sold by jobbers from coast to coast

Made by

THE WALLACEBURG BRASS & IRON MANUFACTURING CO., LIMITED

WALLACEBURG, ONTARIO

Winnipeg,
Moncrieff & Endress, Ltd.
Scott Bldg.

Toronto,
L. N. Vanstone,
8-10 Wellington St. E.

Montreal,
J. R. Devereux
142 St. Joseph Boulevard West

We Manufacture

Everything the Sanitary and Heating Engineer Needs

even down to articles so small that one loses time and money by not using them.

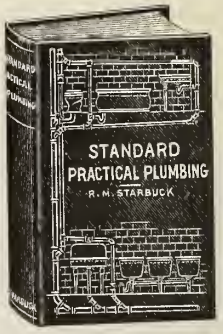
All of our specialties have been designed to be eminently practical in every respect.

Give them a fair trial and you'll always use them.

The BEATON & CADWELL MANUFACTURING CO.

New Britain, Conn.

Eastern Agent: J. R. Devereux, 142 St. Joseph Boulevard West, Montreal.
Western Agent: A. E. Hinds & Co., Chamber of Commerce, Winnipeg.



A WANTABLE BOOK

Standard Practical Plumbing

By R. M. Starbuck

347 SPECIALLY MADE ILLUSTRATIONS

PRICE $3.00

"Standard Practical Plumbing" is indispensable to the Master Plumber, the Journeyman Plumber, and the Apprentice Plumber. As the book is specially strong in the exhaustive treatment of the skilled work of the plumber, it commends itself at once to every one working in any branch of the plumbing trade. Send for it to-day.

TECHNICAL BOOK DEPARTMENT

MACLEAN PUBLISHING COMPANY
143-153 UNIVERSITY AVENUE - TORONTO

ASHDOWN'S WATER SUPPLY SYSTEMS

Convenient DIAMOND A BRAND ASHDOWN'S GUARANTEE **Reliable**

For country homes, farm use, summer resorts and isolated public and private institutions. Hand, Gasoline and Electric operated.

Any dealer can Sell and easily Install these Systems.

Running water is no longer a luxury. A system for every condition and every purse.

Affords fire protection and modern conveniences. Stock watering and domestic use.

A country home with the modern conveniences of up-to-date Water Supply System. Hot Water Heating and Plumbing.

Until recently, only those that were within reach of a city water supply were able to enjoy these conveniences, but with the aid of the Pneumatic Water Supply Systems, this condition has been changed.

A request will bring to you a supply of free booklets with your name printed on the front cover for distribution among your customers.

The J. H. ASHDOWN HARDWARE COMPANY, LIMITED

CALGARY **WINNIPEG** SASKATOON

Importers and Jobbers in Steam, Water, Mill and Plumbing Supplies.

BUSINESS LOGIC!

ADVERTISING is intended to stimulate trade; to establish a connection for the advertiser and make his name well known; to standardize his product and educate the public to an appreciation of its advantages.

¶ If advertising is useful in times of peace, should it not be just as helpful in times of war?

¶ Should not the connection established during a period of commercial prosperity be maintained, even strengthened, until prosperity returns?

¶ Should not the process of familiarizing and educating go on?

¶ If not, why not?

¶ Changes are taking place in the industrial life of Canada. New businesses are coming into existence, some encouraged by the unusual conditions—others undaunted by them. New markets are being opened up. The industrial map of Canada, like the geographical map of Europe, is changing.

¶ The persistent advertiser will keep in touch with his old friends and meet the newcomers. During times of war he will get his share of business and when the war is over his prestige will have been strengthened and his connection enlarged. He will have lost nothing and gained much.

WOLVERINE COMPRESSION BIBBS

Red Brass
Polished or Nickel Plated
GUARANTEED

Furnished with Tee Handle as per cut and with Brass or China Index Lever Handle.

Spout has proper angle to throw the water outward into Dish or Pail, no matter how close to wall or sink back the bibb is installed.

Swivel stem insures long life to washer, as it cannot grind on seat.

Positively the best bibb on the market for the price.

MADE IN CANADA
BY THE

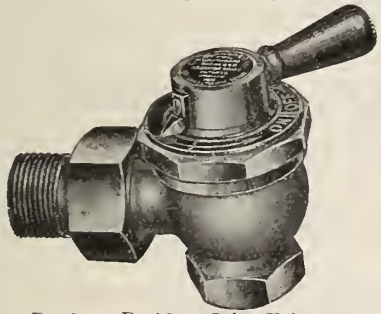
Canadian Wolverine Company, Limited
CHATHAM, ONT.

DUNHAM VAPOR HEATING SYSTEM—What it is
(Continued)

The Dunham Vapor System is not a complicated piece of apparatus adapted only to large, expensive buildings, but a system of simplicity in design, and moderate in cost, which can be used on the smallest residence with resulting economy and paying dividends in convenience.

The Dunham Vapor System makes use of any standard cast iron Steam Boiler, needing no greater or less capacity in proportion than the ordinary steam or hot water heating.

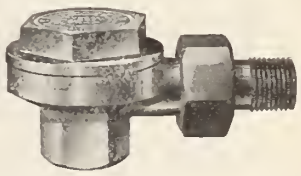
The Dunham Vapor System makes use of standard cast iron radiators (hot water type), and with the advantage of being smaller in size than on the hot water system. Another extremely good feature to note here is the absence of troublesome, sputtering air valves on each radiator.



Dunham Packless Inlet Valve.

The Dunham Packless Inlet Valve applied at top of radiator for steam supply makes it convenient for operation, and being absolutely non-leaking, gives service free from damage to furnishings.

The Dunham Radiator Steam Trap at bottom of radiator connectiug to return line insures full efficiency of that heating unit, by keeping the radiator free from air and water of condensatiou.



Dunham Radiator Trap.

The Dunham Vapor System piping is very simple. For the usual residence work a single supply main around the basement, with branches and risers to radiators and a return main back to boiler, is all piping necessary, and has the added advantage of being small in size. All air is vented in basement through special Air Eliminator.

The Electric Boiler Pressure control is easily installed when following full directions given.

The Electric Temperature Control also is simple in installation and positive in operation.

The Dunham Vapor System of low pressure steam heating is unique in its absolute reliability and economical operation. It is something which every Sanitary Engineer in Canada should know about.

Our Bulletin No. 11 gives full information and installation details.

"Made in Canada."

C. A. DUNHAM CO., LTD. - Toronto, Canada

MONTREAL—Room 20, 11 St. Sacrament St.
FORT WILLIAM—Plumbing & Engineering Supply Co.
HALIFAX—General Contractors Supply Co., Ltd., McCurdy Bldg.
VANCOUVER—520 Duncan Bldg.
CALGARY—Metals, Limited.
WINNIPEG—405 Tribune Bldg.

SANITARY ENGINEER

PLUMBER and STEAMFITTER of CANADA

Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, JANUARY 1, 1915 No. 1

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NO TROUBLE

Closet Tanks

(Made in Canada)

NO LININGS TO LEAK

NO JOINTS TO OPEN UP

Over 190,000 now in use

A Vitro Tank once installed, Trouble has ceased. All the Little things as well as the Big things taken care of at the factory, before it reaches the Plumbers' hands.

Tested under service conditions and examined in all departments for any defects.

Material—the best obtainable.

Design—Chaste.

Finish—Unequalled.

Filling a long-felt want. A strictly high-grade Tank at a reasonable price.

Write for circular and name of your nearest jobber who handles Vitro Tanks.

VITRO Guarantee

A new Tank will be given to replace one that at any time proves defective from either material or workmanship.

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65-75 Sterling Road, TORONTO, ONT.

Made in Canada

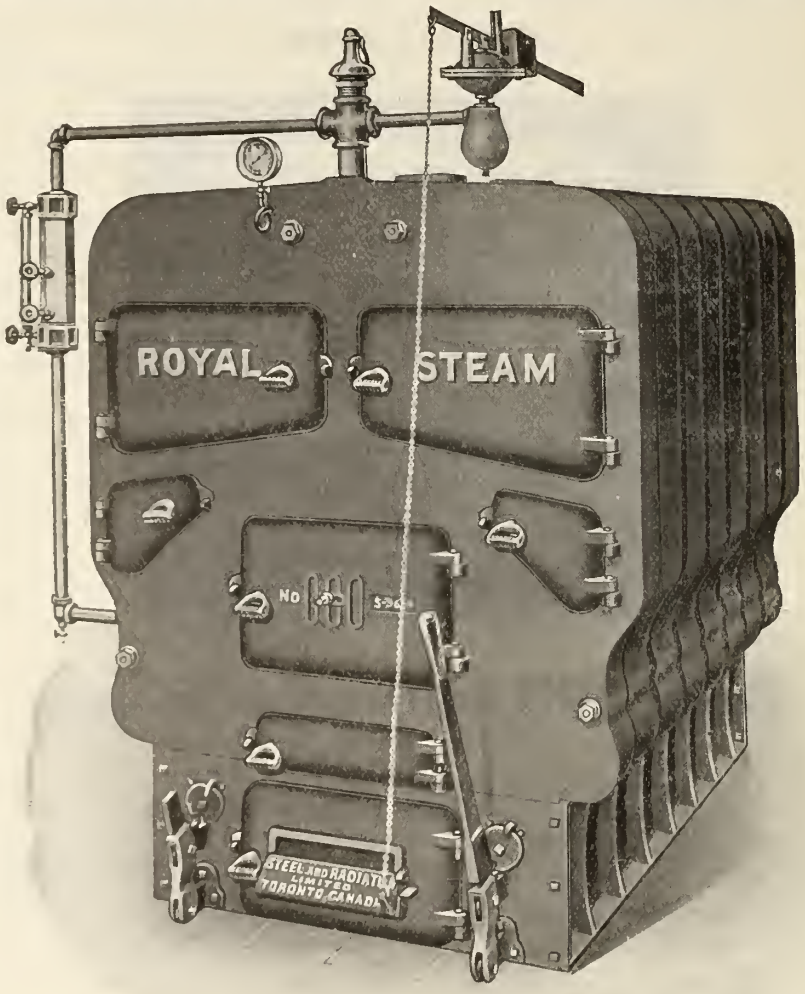
BY—

STEEL AND RADIATION, LIMITED

ROYAL STEAM BOILERS

The **First** Cast Iron Sectional Boiler to be passed and approved of by The Ontario Government Boiler Inspectors in accordance with the New Steam Boilers Act.

Make sure that the Heating Apparatus you buy is **Made in Canada**



Special Features:

Arched Fire Chamber

Special Cleaning Facilities

– Fire Travel –

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THE SANITARY ENGINEER

VOL. IX. JANUARY 1, 1915. No. 1

Hail The Sanitary Engineer!

A Brighter Outlook Foretold for the Craft, By the Very Fact of Having Taken Up the Title Justly Belonging to It—A Real Heart to Heart Chat With The Sanitary Engineer and its readers.

By A. C. Campbell.

THE SANITARY ENGINEER is about the most hopeful sign of the times known to me at this writing. This technical paper was once called The Plumber and Steamfitter or something of that kind. The change is not one of name only, but of spirit, and is not merely personal but representative. It stands for the regeneration of a class, and self-regeneration at that. There is no miracle of goodness we may not hope for now that the plumber is dead and from his remains there struggles into life a worker with an ambition to be of service to the world.

My own opinion is—being a crank, of course, and quite accustomed to having my opinions scoffed at—that the building trade as a whole, from architect to drain-digger, is the one business that lags behind in the great march of civilization. I prove it in this way:—In every other business prices tend, on the whole, to fall while quality improves, but building grows more expensive. Some people deny this—for a few minutes until they actually face the facts. After that they turn to explanations, such explanations being mere excuses which, on the whole, instead of being a palliation are an aggravation of the offence. Account for it as you like and justify it as you may, the fact is that the building business is the great laggard, shuffler, duffer and excuse-maker of modern industrial life. Others, as time goes on, contribute more and demand less; the building trade makes a pretence—it is mostly pretence—of giving more, but it certainly demands and receives more.

As, according to the poet, in every depth there is a deeper still, so in the shuffling and incompetent building business there has been one man who was more condemned even by comparison with those with whom he was associated.

Deceitful even in matters of life and death, extortionate, incompetent and lazy, the plumber was a drag upon and a disgrace to even his fellows in the building business. His trade was filthy and he made himself worthy of it. He became unspeakable and many of us thought him hopeless.

In all the literature of this passing time no production has so startled and enthused the world as Charles Rann Kennedy's play "The Servant in the House." In that play, it will be remembered, the ideal and the real, the heavenly and the earthly, are brought together embodied and personified as two men—brothers. Both are servants, but one works in the sweetness of daylight and in those offices which are known and appreciated. The other is the Drain Man, whose labor is below ground, out of sight, amidst poisonous exhalations from the filth which former bad workmanship has allowed to accumulate. But it appears that the Drain Man has not been condemned to this service, but is self-elected to it, glories in it and will engage in no other. And when the man of the world—religious in form but really the man of the world—is to be converted from ease, display and self-assertion to a life of real service, it is the rugged talk, the enthusiasm and above all the example, of the Drain Man that finally wins him, and the curtain goes down as those two brothers clasp hands in a very ecstasy of resolve to devote their labor and their lives to work in the filth underground in loving service of their fellow-men. And the audience feel that such men are to be honored and revered, that their work does not defile them but ennobles and glorifies them.

This is the way the dramatist preacher presents the case. Of course, it is a piece of artistry, and the lights and shadows, the arrangement of the figures and colors of the background are all made to produce the greatest effect. But, personally, my enthusiasm does not go out with the theatre lights after such a play, nor does it live only in the thought of a beautiful fable of social regeneration and a vision of "All the glory yet to be" in this good world. I believe in the gospel of service as the best and wisest of business leaders are preaching it and living it to-day. And when I see that gospel carried into effect by the Drain Man of real life "The Plumber," and in the actual work which makes for sense and sanitation in our house construction and the administration of our cities, I am even more enthusiastic than when I see the more picturesque but lean real presentation of the theme by actors in a parable-play.

The plumber of yesteryear was scolded, derided and legislated against. But there seems to be something, so far as this world at any rate is concerned, in that metaphysical doctrine which declares that the regeneration of man must come from within. Let it stand to the everlasting glory of this ancient scoundrel, the plumber, that he first among builders has experienced a change of heart, he first has realized that he is engaged in a service which is noble because of its opportunities and may be made glorious by its achievements. Because the sanitary engineer to-day replaces the plumber, because that which was at one time a horrifying and disgusting graft is being transformed into an honest and serviceable business, I am ready to take back all the hard things I have ever said, or even thought, against every part of the building business. With sanitary engineers to lead in science, invention and skill, and above all to lead in a sincere desire to serve the public whose servants we all are, there is no reason why the whole building business should not be reformed and made what it probably should be, a leader in the work of the world.

Ruskin, the great prophet of architecture, the man who saw the buildings not as art merely but as service, had one final word to say about life and art and in it he put the chastened wisdom of his life study and experience. He dealt with the arts one by one, and when he came to the very climax of this his greatest effort to impress truth upon his hearers, this is what he said:

"Lastly, take the art of building—the strongest, proudest, most orderly,

(Continued on page 19.)

From Plumber to Parliamentarian

REPRINTED FROM MACLEAN'S MAGAZINE.

By Harry W. Anderson

PARLIAMENT had just prorogued. The ceremonial was concluded. Royalty had driven away. Scarlet-coated soldiers and brass-buttoned bandsmen had "fallen out" and mingled again, as ordinary citizens, with the curiosity-satisfied onlooking proletariat. The show was over.

Yonder in the deserted Commons Chamber scores of messengers and pages were already busy packing up. One after another the desks of departing members were being overhauled — cleaned out. Nondescript piles of papers and packages were scattered about with inartistic abandon—miscellaneous debris in dreadful disarray. School was out, and nobody cared now for appearances.

A big, solid, square-shouldered man in his shirt-sleeves was among the busiest of the house-cleaners. He devoted his efforts to the contents of one desk. There was no disorder there. The blue-books, all thumbed and marked and checked, were first deposited in a neat parcel, and then carefully corded together. The plethora of parliamentary papers were industriously sorted and indexed and fyled. It was a hot day, and, once in a while, the worker paused to wipe the perspiration from his forehead.

From one of the entrances came the sound of feminine voices. A coterie of radiantly - attired ladies, evidently from attendance at the recent elaborate function in the Senate Chamber and, mystified by the labyrinth of corridors into which they had strayed, made a somewhat flustered appearance. The big, solid, square - shouldered man in shirt-sleeves was just depositing a massive corded consignment of blue books on the floor. To him the leading lady appealed.

"Are you," she asked, "one of the servants in this building?"

The big, solid, square-shouldered man in shirt-sleeves bowed. "I am, madame."

Then he stolidly conducted the strayed party to the exit sought.

As he turned back the distinguished figure of Sir Wilfrid Laurier came into view. With hand extended the former Prime Minister stayed his progress, exchanged a few friendly words and patted him affectionately on the back.

"Who is that man?" queried one of the now surprised ladies of a nearby attendant.

"The man Sir Wilfrid is talking to? Why, that's Mr. Verville, the member for Maisonneuve," was the response.

"Oh," gasped the fair visitor, adding in an aggrieved tone, "And he told me he was a servant!"

But he told the truth. Alphonse Verville is a democrat who believes in democracy. He still serves. Being a member of Parliament means wider scope for service. That's all.

In a double sense Verville holds a unique position in Canada's Parliament. He serves more of his fellow Canadians than does any other member on either side of the present House. The constituency which elects him has a larger population than any other of the two hundred odd ridings represented. He polls more votes than any other parliamentarian. But, beyond this fact, significant in itself, he is Labor's one and only representative. His constituency is not limited even to the cosmopolitan and populous confines of Maisonneuve. It really extends from ocean to ocean. To-day he is fighting the legislative battle of the British Columbia miner; to-morrow he is waging war for better working conditions in the big industries of Nova Scotia. Labor, when it sent Verville to plead its cause among the nation's legislators, supplied a real asset to the national life. There are plenty of men, Heaven knows, inside and outside Parliament, who make it their profitable business to look after the Interests—with a capital I, always. But apostles of the people—the common, everyday, ordinary folk—are still scarce enough in the halls of the mighty. Verville has done some little leavening, but the whole lump can stand more yet.

Above is a likeness of Alphonse Verville, M.P., from a recent photograph. Below is a view of the plumbing shop that he ran in partnership with Joseph Laurier, Montreal, before his entry into the field of Dominion politics.

Most men come to Parliament as politicians or theorists. They come looking for preferment, or seeking a career. Verville came to do a job. He wants to put something human into the dry bones of legislation. He wants to make things better for the crowd, the crowd outside. He hasn't overmuch patience with the elect. He isn't concerned with the liquidation of partisan liability. Nor is he worried with the niceties of precedents, of formulas, of "non-intervention," of taking-the-matter-under-consideration, and the other acrobatic arts of parliamentary trapeze-work. He doesn't know—and doesn't care—much about these things. But he does know life at first hand, and he does care about the conditions which surround it.

ALWAYS A WORKER.

Verville has been a worker all his days. He has trained for Parliament, not in the

political club or caucus, but in the big industrial workshop of a young nation. He hasn't studied the classics to any extent, but he has thoroughly studied himself and his fellow men. He is singularly open to impressions from without. Few men oscillate so rapidly from side to side when their own opinion is yet unformed. But there is with all this an intense and abiding adherence to what he deems to be essential and a staunch tenacity of grasp when an idea has once become fixed with him. Like a big ship swinging at her anchor, he sways about with the ebb and flow of the tide; but he does not drift from his moorings. And he is not the man to flinch from an unpleasant or perilous situation once he hears the call of conviction.

A PLUMBER'S APPRENTICE.

Nearly fifty years ago Alphonse Verville was born in the modest village of Cote St. Paul, Quebec. He grew up, as most boys do. Money was not superabundant in the Verville home, so the boy was sent to work. In his early teens he was apprenticed to the plumbing trade. He worked during the day, and studied during the night. He learned his trade and became a master plumber. He absorbed history and economics and set himself to a practical application of their teaching to everyday conditions.

Time went on—and so did Verville. For twenty odd years he worked at his trade, and met with such success as enabled him to set up business for himself in Montreal. But Verville is an example of the heterodox theory that a man can do two things well at the same time. He was not giving all his time to his trade. He had grasped the idea that life could not be measured in terms of business alone. He took an interest in public affairs. Most of all he took an interest in the affairs of the men about him. He became active in Labor circles. For a time he was business agent for one of the biggest unions in Montreal. His interest in the work and his unusual ability were recognized by other Labor men. For six or seven terms he was president of the Dominion Trades and Labor Congress, and probably would have been president yet if he had not seen fit to retire after the congress was held in his own province.

It was in 1903 that his associates began to realize that Verville would be a good man for Labor to have in politics, and when the Quebec provincial elections of 1904 came round he entered the lists in Hochelaga county. It was Labor's first venture in politics in that province and when the ballots were counted it was found that Verville was still on the outside looking in. His opponent, later the Hon. J. Decarie, was duly elected.

That was only the beginning. Verville hasn't acquired the habit of letting defeat daunt him. In 1906 the death of Hon. Raymond Prefontaine created a Federal vacancy in the Maisonneuve division of Montreal. Mr. Grothe ran as the Liberal nominee, and back of him had the full power of the Laurier Government. Verville had back of him the Labor organizations. Grothe didn't get to Parliament. Verville did—and with over 1,000 majority, at that. He came back in 1908 with 4,000, and in 1911 with 3,000. And people who ought to know say he will keep coming back just as long as he wants to.

Top.—A photograph of Mr. and Mrs. Verville taken shortly after they were married. Lower left—A recent photograph of Mrs. Verville. Lower right—Where the Labor member resides.

Verville in Parliament has generally given an independent support to Liberalism. He has strong views on the cost of living, and other intimate economic subjects. Incidentally, by instinct and upbringing, he is a radical. But he is a Labor representative in the last analysis. If the Liberals tramp on labor's toes, Verville is liable to do some tramping himself—and he has a substantial foot!

THE MAN HIMSELF.

This man Verville is, however, essentially a peace-loving man. He looks it. His quiet, full, round face, albeit marked by many deep-cut lines, is benign and pleasant. His greyish-white hair fits in with his mild manner. But parliamentarians on both sides have a wholesome respect for Verville. There is always something to and in his short speeches. Despite his mild-mannered, easy-going appearance, he has splendid courage and, when placidity ceases to be a virtue, there comes stern determination to stand by his conviction no matter what the opposition or the cost.

Labor in the Dominion Parliament differs much from labor in the Ontario Legislature. There is equal earnestness, equal intensity, equal determination to serve with an eye single to the cause espoused. But little Allan Studholme lashes himself into hysterical fury as he pours forth counsel and anathema by the hour. Sturdy Verville speaks by the minute, but there is something doing every sixty seconds. Every sentence is winged toward the bullseye. Studholme, Anglo Saxon though he be, rhapsodizes with Latin fervor and declaims with illimitable gesture. Verville stands stolid, stationary. Occasionally in tense moments, he raises his right hand or sweeps the chamber with his arm, and the accent of Mother France steals back into his clear English pronunciation. What a strange, freakish creature Dame Nature is at times! Surely little, vivacious, dynamic Studholme should have been the Gaul, and quiet, steady, plain-spoken Verville the Asquith-like Yorkshireman.

Labor men — and other people, too—have learned a lot of things about this plumber - politician. For one thing, he's honest. He believes in his cause, and makes it manifest not in words alone, but in actions. His head is clear. He is no coiner of elegant phrases. His are simple, forceful words which permit no mistaking their meaning. His heart is kind—what man succeeds who lacks kindness of heart? His courage stands the acid test when trial comes.

What do the coming years hold for Verville? Politics is not the sphere for the prognosticator. It's too uncertain and dangerous. Yet—and yet—there are those bold enough to undertake to interpret the future.

Of course politicians consider other things than fitness. And the idea that a labor man, out-and-out, whose Liberalism is strongly independent in character rather than of the clear-cut party color, might not suit the Liberal politicians. Again, there is the possibility that the man himself might not be willing to give up his place as the untrammelled representative of the men of toil to become advisor to His Majesty in a party ministry. At any rate it would be safe to assume that he would not care much about the "Honorable." He would prefer to remain just plain Alphonse Verville.

Simplified Sanitary Engineering Methods

Showing That to Simplify the Construction of Piping is More to Be Desired Than Multiplicity of Piping—The Latter Does Not Necessarily Increase the Efficiency.

By Dr. Wm. Paul Gerhard, S.E., New York.

The experiments showed also that the reduction of the size of a five-inch soil pipe to four inches at the roof acts unfavorably, and that a single water closet with two-inch trap seal may be connected directly with a five-inch branch to the main sewer, without running a four or five-inch soil vent pipe up to the roof, provided it is not at the upper end of the house sewer, and also provided there is some vertical pipe line connected with the same sewer, which runs in full size to the roof.

Herr Unna concludes from the entire series of experiments that back-air pipes are necessary only in exceptional cases and under the following conditions, viz.:

(a.) Where fixture traps have less than four inches of water-seal, and traps of water closets less than two inches.

(b.) Where vertical waste or soil lines are of the same diameter as the diameter of the traps connected with them.

(c.) Where fixtures are connected with inside rainwater leader pipes,* not larger than four inches in diameter.

(d.) Where fixtures are located more than 3 ft. 3 in. (1 meter) from the vertical soil or waste line.

(e.) Where several fixtures are connected by an inclined lateral waste with the vertical line. In this case it is only necessary to extend the lateral waste at its upper end the full size through the roof.

When using vertical back-air lines they should not be less than two inches in diameter; only heavy lead or galvanized lead pipes should be used for the branches; the main lines should be of cast iron or galvanized wrought iron; the joints in iron vent pipes should be lead caulked or else screw-joints, and lead vents should have soldered joints. Vent pipes must join the vertical line at a height above the overflow point of the fixture, and be either extended separately through the roof, or connected with the soil or waste line above the highest fixture.

* * * * * * * * * *

The results of experiments made incidentally by Herr Unna to determine the required size of waste pipes for various pipes and faucets, are worthy of notice. The pressure of water was about 56 pounds, and the following results were obtained:

1. A one-inch compression cock supplies more water than a two-inch waste pipe, unobstructed by a strainer, is able to remove.

2. A ¾-inch compression cock furnishes water at the rate of 26.4 gallons (U.S.) in 70 seconds, or $\frac{26.4}{70}\times 60 = 22.6$ gallons per minute, to remove which quantity a full two-inch waste pipe without a strainer is required.

3. A ½-inch compression cock furnishes 15.6 gallons per minute, which stream is taken care of by a two-inch waste pipe covered by a strainer with 50 per cent. effective area.

4. A ⅜-inch compression cock furnishes 5.28 gallons per minute, and a 1½-inch waste pipe (more correctly 40mm.) with 40 per cent. effective area of the strainer will remove the water without danger of the fixture overflowing.

*Many old dwelling houses in New York City still have the soil pipe used as leader pipe, and in such cases the danger of siphonage is admittedly greater, particularly when back-air pipes are omitted. W. P. G.

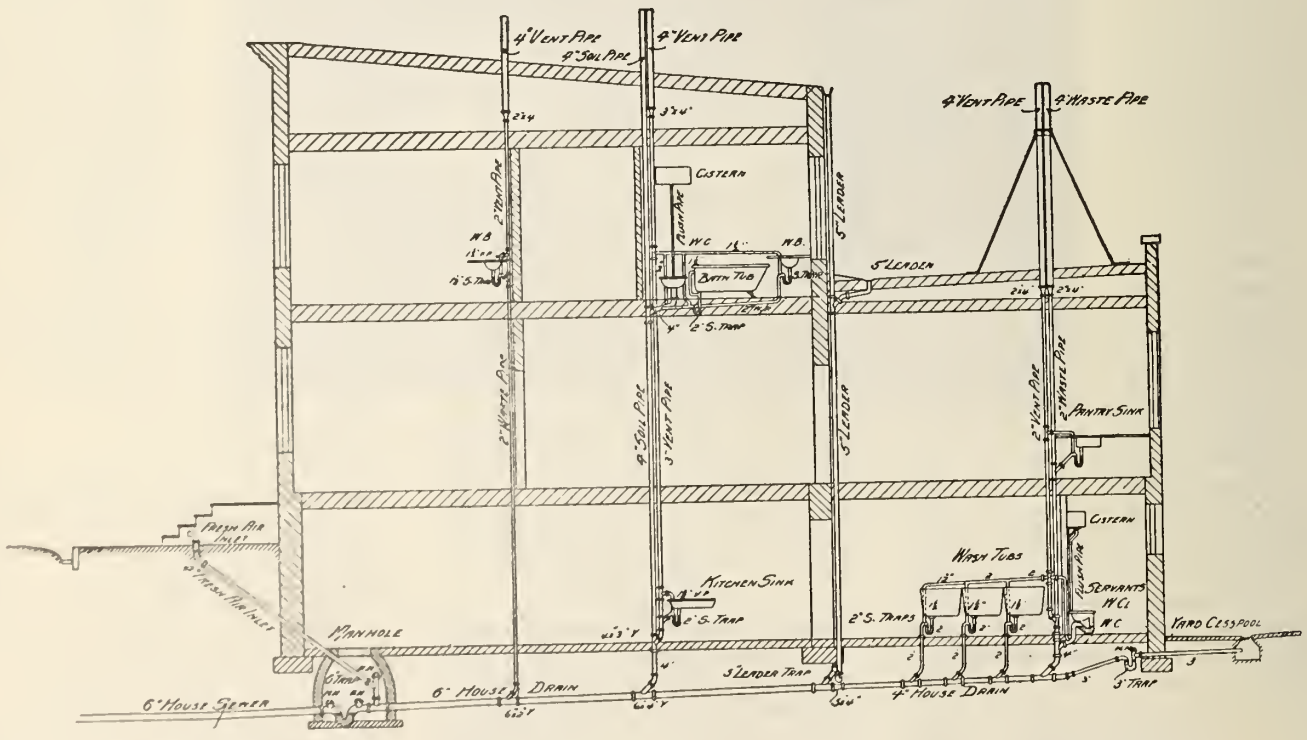


Fig. 102.—System of drainage for house arranged according to the present rules and regulations, with "back-air pipes" for all traps.

For the water pressure existing in Cologne, the use of ½-inch faucets for fixtures with two-inch waste pipes, and of ⅜-inch faucets for fixtures with 1½-inch waste were recommended.

* * * * * * * * * *

In order to emphasize still further the contrast between the present cumbersome plumbing methods and the proposed simplified system, I have drawn in Plate VI., two diagrams, A and B, lettered by way of comparison "Simplicity" and "Complication." My drawing is, in the main, similar to one published by Mr. Putnam some years ago. It shows in both diagrams the same number of plumbing fixtures, namely, a water closet, a bathtub and a washbowl, arranged closely about a main soil pipe line. In the complicated system, we have four vertical pipe lines, viz.: the soil pipe, a back air line, a local vent pipe with steam riser inside of same to create an upward current, and finally, a safe waste line. Each of the vertical lines, as seen in the illustration, has branches to each and every fixture, and the result is a perfect bewildering network of pipes. Is it surprising that plumbing work, thus arranged, becomes very expensive, and that even the best mechanics are liable to make an error in the pipe connections?

Contrast with this complicated system the arrangement shown in A. Here we find the same number of fixtures properly arranged and connected to a single vertical soil pipe, which is extended the full size up to the roof. Each branch from the fixture is made as short and direct as practicable, and thus arranged, does not require the branch venting with its array of complicated piping. Can any one hesitate for a moment as to which is the more preferable system?

In Figs. 102 and 103, I present for further explanation two diagrams of a system of house drainage. Fig 102 illustrates the plumbing of a house in which the fixtures are trapped by ordinary S-traps, which have "back-air" pipes attached to them, while Fig. 103 shows the same house with the same fixture system arranged on the "one pipe" or simplified system. I am confident that a closer study of these diagrams and of the principles laid down earlier in this chapter, will convince every thoughtful mind as to the great advantages of the method advocated by me. I venture to express the hope that it will not be very long before the simplified method will have more friends and advocates than the old method.

NEW BOOKS.

The Monash-Younker Co., 90 Centre St., New York, are issuing four very valuable bulletins containing new and useful information, not only of their own steam specialties, but also of steam heating systems generally. These bulletins are entitled "Monash" pressure regulating valves "noiseless system of vacuum heating," "Stop back pressure on your engines" and steam specialties," and may all be procured by applying to the above-mentioned address.

Gas Burners for Furnace Heating.

The Standard Heating and Radiator Co., Pittsburg, have just issued two very instructive booklets: one is entitled "Standard Gas Saving Burners" and the other "Artificial Gas for Fuel." These booklets may be procured free by applying to the above address.

HAIL TO THE SANITARY ENGINEER.

(Continued from page 15.)

most enduring of the arts of men: that of which the produce is in the surest manner accumulative, and need not perish or be replaced: but if once well done, will stand more strongly than the unbalanced rocks —more prevalently than the crumbling hills. The art which is associated with all civic pride and sacred principle: with which men record their power, satisfy their enthusiasm, make sure their defence, define and make dear their habitation."

This is the vision. In the realization of that vision first comes the drain man. And in the great drama of our economic life, the Drain Man, the sanitary engineer, may be what his prototype is in the stage drama I have cited—the leading character of the play. It is because **The Sanitary Engineer** has caught something of that vision and is trying to make it real that I glory in it and wish it success.

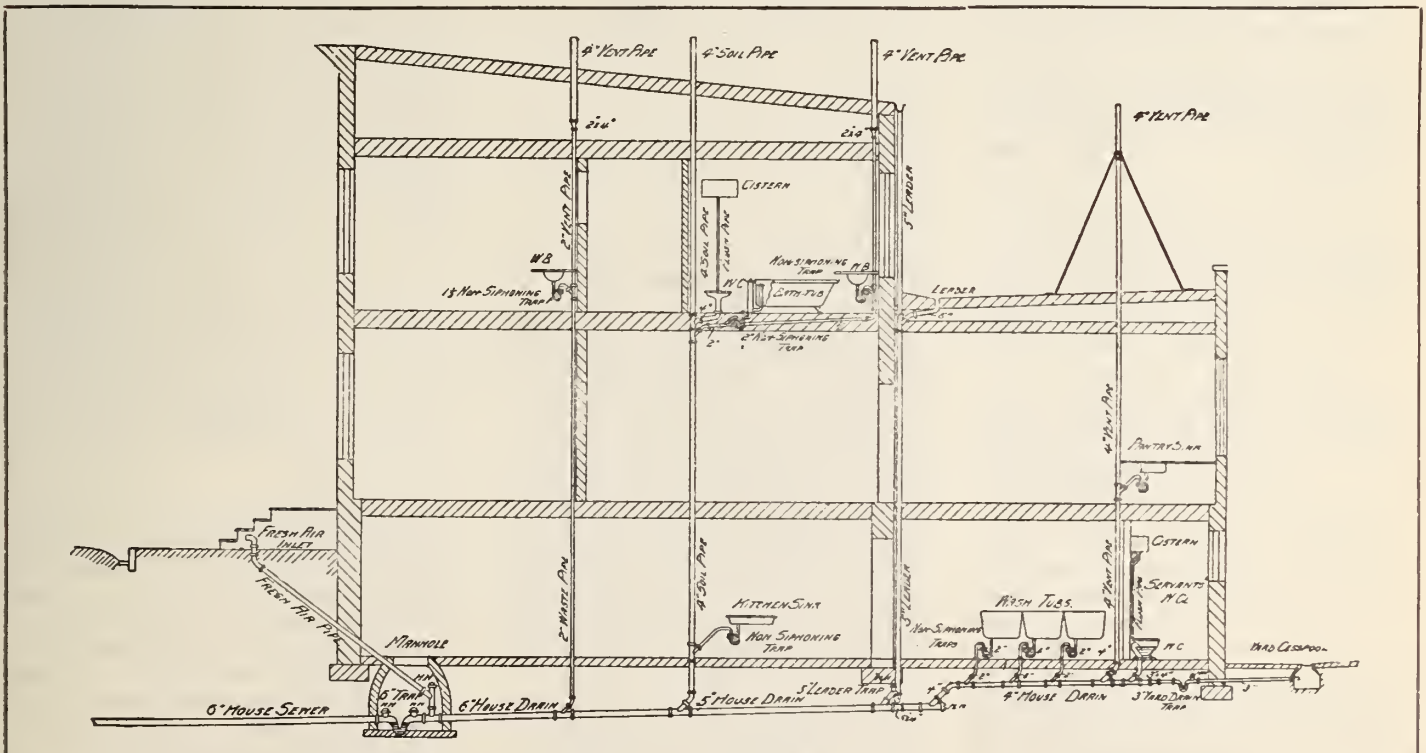


Fig. 103.—System of drainage for a house, arranged in accordance with simplified plumbing methods advocated in this chapter.

Analysis of Can. Sanitary Engineering By-laws

Commenting Upon the By-law Known as By-law No. 528, Governing Sanitary Engineers and Sanitary Engineering Construction in the Town of Waterloo, Ontario.

(Continued from last issue.)

CONTINUING this series, we will next take up clause 32, which reads as follows:—

Clause 32.—The drain pipe from a refrigerator or other receptacle where provisions are stored shall not connect with any waste pipe, soil pipe or sewer.

This clause could be improved by adding that "if a refrigerator drains into any other fixture already trapped there should also be a trap on the refrigerator waste pipe, which should be easy of access."

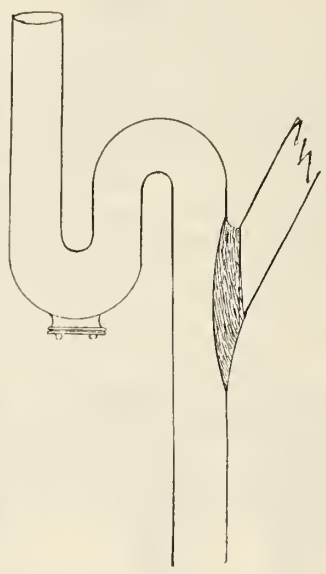
The reason for such a suggestion is this: Often a refrigerator is allowed to waste into a basement fixture, which may be either a sink or a lavatory, and the traps on these two fixtures many a time are allowed to dry out because of their not being constantly in use. Then, it has been found that a foul odor has escaped up through the waste pipe into the room where the refrigerator is located.

Another feature of this waste pipe is that it is very apt to become choked up, and should always be installed in such a way that it can be easily cleared out.

TRAPS AND VENTS.

Clause 33.—Every water closet, urinal, basin, sink, wash tray, bath tub, and every tub or set of tubs, must be separately and effectually trapped as near the fixture as possible, and never more than two feet therefrom.

This clause is one which, while very definite in itself, is not by any means consistent with clause 35, which we will introduce later on in this article. It is not even up-to-date, but is copied from an old by-law of some older town or city. For instance, we have yet to be shown the necessity for back venting the lead bend of a w.c. when that fixture is less than 30 inches from the main stack. Even if the waste from the lavatory and bath is allowed to enter the lead bend, and providing those fixtures are vented, it is not necessary to vent the lead bend of the w.c., that is, of course, when there are no other fixtures on an upper floor, which need a 4-inch waste pipe. Any fixture, such as sink or laundry tubs, if connected into the drain, should by all means be back-vented, though we are of the opinion that if a pair of laundry tubs were installed in the basement of a single house and not connected to the drain at all, they would be far more sanitary than if connected to the drain, when they would have to be vented and trapped as well. The traps on these fixtures are often found dry because they are not often in use more than once a week; then when the fixtures, which are situated above, are flushed, there is a foul odor forced up through the unsealed trap. It would also be a great help to sanitary engineers if there were plans accompanying such a clause, showing exactly where and how traps should be vented. If crown venting is allowed or otherwise it should be so stated. Fig. 1 shows the very latest method of trap venting now in use, and



New method of venting lead S trap.

one that is being adopted more and more every day. We do not endorse the crown vent under any circumstance.

Clause 34—Every trap, except on water closets, sinks and stationary wash tubs, must be vented either by continuing the vent pipe as in section 31, or by a special vent pipe extending above the highest fixture on it, but in buildings of more than two storeys every trap must be vented. The vents may be combined by branching together those that serve several traps. These vent pipes must always have a continuous slope to avoid the collection of water by condensation. Where proper air ventilation cannot be obtained, then, water closet seats must be back-vented, but not into stack.

This clause contradicts, or rather seems to cancel clause 33. It says: Every trap, "except on water closets sinks and stationary wash tubs, etc.," which, in fact, excepts every fixture with the exception of lavatories, baths and urinals. There is something very strange indeed, here, particularly when we read the next clause.

Clause 35.—Water-sealing traps of any pattern approved by the inspector may be used when separate air pipe connections are provided. On sinks and stationary wash tubs not vented, ideal or other deep seal traps must be used.

This clause again is rather strange; in fact, clauses 34 and 35 are both new to the writer, and seem to be out of order altogether. It is quite evident that no practical sanitary engineer ever drafted them.

The first part of clause 34 states that every trap except on w.c.'s, sinks and stationary wash tubs, must be vented, etc. Then it demands that every trap must be vented if the building is more than two storeys high. We do not see why these fixtures need to be vented because of the building being more than two storeys high, providing there are no fixtures on the upper floors. Even then there would be no need to vent the traps on the top floor if there were only one bath room, and every fixture were directly connected with the main stack.

Then clause 35 reads a little strange. It says: "Water-sealing traps," etc. We would like to know what other kind of traps there are other than "water-sealing traps." Next this clause says that "on sinks and stationary wash tubs not vented, idea or other deep seal traps must be used."

We strongly endorse the use of deep seal traps every time, but here is a case where if any fixtures in the whole house should be vented they are the sink and stationary wash tubs, because there is generally a w.c. and other fixtures above them, in which case, if the sink and wash tub is not vented, the flushing, particularly of the w.c., is bound to create a back pressure upon the water of the lower traps, that is the sink and

wash tubs. Referring to the latter portion of clause 34, which states "that where proper air ventilation cannot be obtained, then water closet seats must be back-vented, but not into stack."

This, we believe, does not mean to refer to any portion of the waste or drainage pipes from the fixtures, but rather to ventilation of the apartment where the w.c. is located, and refers to the local vent. We never heard of a seat being "back vented," but have often seen w.c. bowls as well as seats with a local vent attached.

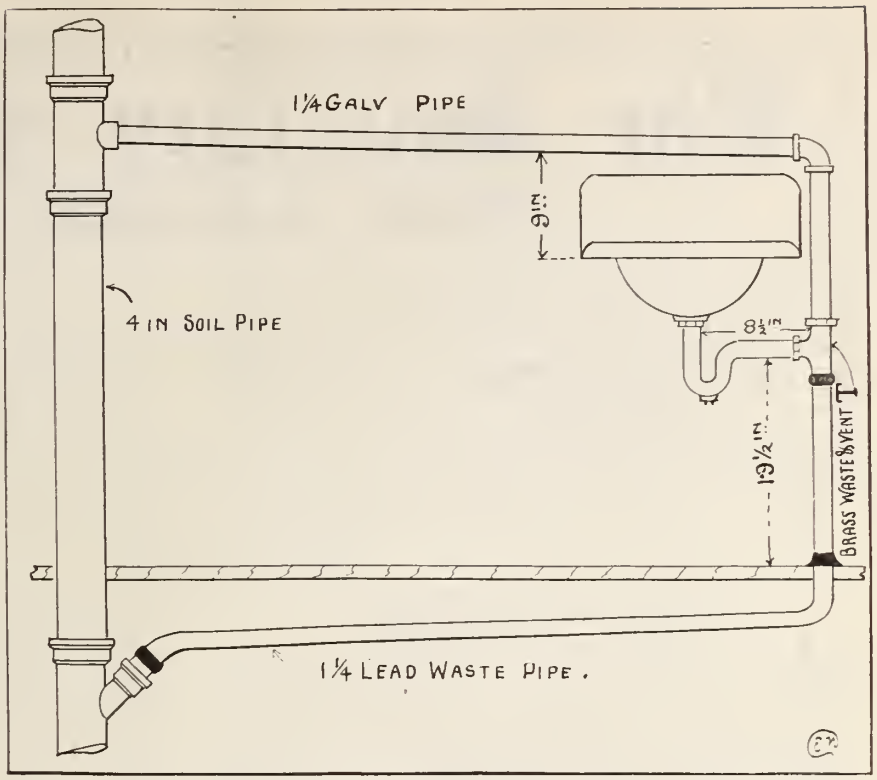
Clause 36.—No vent pipe shall be used as a waste or soil pipe.

This clause is O.K. and very clear and finite. So are clauses 36 and 38, which as follows:—

Clause 37.—No brick, sheet metal earthenware pipe or chimney flue shall be used as a sewer ventilator, or to ventilate any trap, drain, soil or waste pipe.

Clause 38.—No closet or other convenience which allows the escape of air or gas into the house, or which allows the accumulation of filth in or about it, shall be used.

(Continued in next issue.)



An installation which was recently condemned in favor of Cramm venting.

A Chat About Supply and Demand

Sanitary and Heating Engineers Should be Sanitary Heating Engineers—Very Few Heating Systems Which Are Installed in Our Homes Are Sanitary—Why?

VERY few sanitary engineers seem to realize that most businesses are controlled by the question of supply and demand. Some business men claim that prices are governed by supply and demand, and to some extent this is true. But in the case where there is no demand, what then? Where will supply be. Now here's the point. The writer has for years given the question of humidity a great deal of thought, and in Nov. 16th issue of the Sanitary Engineer, published an article upon the subject, a few days after the article appeared, several members of the trade stated they had given the subject of humidity very little thought, but intended to do so in the near future.

The writer took the question up with several persons he met on the car, and out of 12 persons spoken to, not one had ever heard of the matter before. Later it was found that two have already installed humidifying pans behind their radiators. Here is a case where there is lots of demand, but supply is not looking after the business. How many things could the sanitary and heating engineers sell: if they would only get out and create demand. If manufacturers had never advertised their goods there would have been scarcely any demand for many appliances at present in use. Just imagine readers, that the human race spends not less than one-third of its existence indoors, where there is little or no humidity, and no provision made to supply it. In fact the race as a whole spends more than one-third of its life indoors. The housewife spends at least two-thirds and the children up to 14 years of age spend half. Now, what can sanitary and heating engineers do to improve these conditions? They can create a demand by voicing the question at every possible opportunity. They can create a demand for any or all kinds of evaporating appliances to be used either on the radiators, or in the registers of the warm air furnace. Further, to create such a demand would not only result in new business, but would also show the customer how necessary such evaporating appliances are to the health of the occupants of a room.

Waterworks Improvement.

It has been announced that the construction of the aqueduct for the Greater Winnipeg water district will be commenced in March.

* * *

A by-law will be voted on in January to raise $65,000 for waterworks improvements at Fort William, Ont.

* * *

The waterworks improvements at Hull, Que., include the installation of an eight million-gallon turbine pump.

* * *

Extensions to the waterworks system at Hespeler, Ont., are contemplated. A by-law will be voted on to raise the necessary funds.

* * *

A by-law will be voted on by the citizens of Parkhill, Ont., on January 4 to provide for extensions to the waterworks at a cost of $3,000.

* * *

A by-law will be voted on by the ratepayers of Brantford, Ont., to authorize the expenditure of $100,000 on a pumping station and water mains.

* * *

Dunnville, Ont., proposes to spend $12,000 on waterworks extensions. A by-law will be voted on by the ratepayers to raise the necessary funds.

* * *

By-laws will be submitted on January 4 to authorize the expenditure of $10,000 on new pumps, water main extensions, etc., at Bracebridge, Ont.

The Sanitary Engineer

Plumber and Steamfitter of Canada

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TORONTO, JANUARY 1, 1915

New Year Greetings

HERE we are at the dawn of another year, what is it going to do for us? and, what are we going to do for ourselves? The year 1914 was peace year to Canadians, peace year celebrations were held throughout this country as well as in the United States. The close of 1914 left us in the midst of an awful war, therefore to some it seemed somewhat of a paradox to indulge in peace celebrations. But in very reality 1914 will stand out as peace year —the beginning of a lasting peace. The war is not the beginning of war by any means. Could it be truly said that we were at peace with the world on the one hand, while on the other hand we have been building huge guns, forts, battleships and other machines of destruction? Some say these have been built to preserve peace. Well, be that as it may, the destruction of these same machines will bring a lasting peace, and the destroying of them began in the year 1914. Now we turn to 1915.

The whole world should get down to the business of peace, not only national and international, but rather true brotherly peace, every trade should cooperate in such a way as to bring about peaceable methods of doing business. The sanitary and heating engineer should see to it that they be paid for their just labors they should see to it that they strive to give one hundred cents value, for every dollar they receive. They should charge for their advice, but see to it that the advice is worth the price. To do this every person engaged in the trade should see that he is master of his calling. When asked to install certain work which will not give proper service, he should refuse to do the work, and when refusing, point out to the customer what is required to give efficient service, just such a stand will create a lasting peace between the trade and the public.

Create Public Confidence

AT THIS season of the year, when the weather is the most severe, we are being called upon from all sides, to explain why this or that furnace is not heating So-and-so's house, etc. The writer has in mind a case where a person had several houses built and a certain size furnace was specified by the architect. The furnaces were of course installed but do not heat the houses. Upon an investigation being made it was found that to allow about 15 per cent. overload the furnaces should have been two sizes larger. The owner upon being told that the furnaces were too small said, "Well, why in the name of goodness did not the heating engineer tell me this?"

It was pointed out to him that had the heating engineer interfered, he would probably have got into the wrong with the architect and the owner would most likely have come to the conclusion that the heating engineer was trying to make the job more expensive, etc. And no doubt such would have been the case at the time of installation, but there would have been one more heating engineer with a good reputation which could be relied upon. To create public confidence pays far better in the end than getting every contract that comes along. This particular case has been remedied, larger furnaces have been installed in spite of the extra cost and there is comfort in those homes.

One great trouble with the average sanitary and heating engineer, is to try and grasp every job that comes along, price being a secondary matter, results are little or no profit, poor installation, reputation either lost or very much deteriorated, and the public thoroughly disgusted with the whole craft.

"If there is one man I hate to have to call upon to get work done, more than another It's the plumber" is the by-word of nine persons out of ten, and the craft are content to resent such conclusions, rather than to find out the reason, and eliminate it. This can only be done by each individual taking the stand that they will from now on devote more time to the science of sanitary and heating engineers, refusing to install work which will not give the very best service it may be called upon to give, and placing a value upon one's time and charging for it. No person asks for information from the sanitary and heating engineer, which can be gotten from any other source. No person ever calls on a sanitary and heating engineer to do work which any other tradesman can do and do properly, therefore, the craft should put a value upon such knowledge and services, and no doubt it will be more respected in the future than has been the case in the past.

The Law Not Enforced

ON another page an article appears which calls the attention of the Ontario provincial cabinet to the insanitary conditions which prevail in Toronto, Hamilton and London factories, foundries, etc. It is pointed out that, although there is helpful legislation on the statute books at present, these laws are not being enforced. It would be very interesting to the people of Ontario, and in fact of the Dominion, to know just how many laws are and are not enforced. The Sanitary Engineer is of the opinion, however, that provincial health laws are not as desirable as Federal laws of health. What Canada needs first in sanitary engineering construction is a Federal Department of Health. Such a department would be of great service throughout the whole Dominion. There is no reason in the world why the Dominion of Canada does not take the lead in Sanitary and heating engineering construction, because our climatic conditions are so varied and unique. There should be a uniform plumbing code throughout the Dominion, but who is to compile one? If one province should shoulder the responsibility that province would have to consult every other province, and the work done by that one province would be copied free by the others. Nothing would assist matters more than a federal department of health. The Sanitary Engineer published an article upon this subject in November 15 issue, 1913, and pointed out the various matters which could be dealt with by such a board. Has it ever dawned upon any member of the craft that the burden of modelling and re-modelling the installations of sanitary engineering has been done by a few individuals throughout the Dominion? No government assistance has been available, yet as a whole we in Canada have some of the finest and most efficient methods in operation that can be desired, except that there is no uniformity, and some towns and cities adopt methods totally unfit for their climatic condition. It is simply a case of copying from one city to another, when such a course is anything but desirable.

From Plumber to Parliamentarian

THE above is the title of a very interesting article appearing on another page of this issue by H. W. Anderson, and is the history of a man who has made good, not in the sense that some large financial men would term a success, but by the very fact that he serves. This world is overloaded with financial parasites, who simply acquire gold so as to make others serve. The man whose whole life is one of service is the success which counts, such is the case with Alphonse Verville, M.P., he is a true servant of the Dominion, of the people of the Dominion as he showed by his answer, when asked "Are you one of the servants in this building?" It cannot help but be inspiring to know that even though a plumber, or sanitary engineer, one may aspire to become a servant in the House of Commons—a true servant of the people. Sanitary engineers as a whole are poor at making their voices heard and until they become inspired in their calling they cannot expect to be heard. As The Sanitary Engineer has said many a time, we are truly servants of the public but have not taken pride in our calling, nor made ourselves plain with the people. We should speak out fearlessly and be heard as has Alphonse Verville, M.P., for Maisonneuve.

A Few Duties for 1915

THERE are a few things which every sanitary and heating engineer should strive for during the year 1915. He should advocate that before a license be granted to any person who intends to engage in the installation of sanitary and heating systems, the applicant should be compelled to pass some kind of an examination, proving his fitness and trustworthiness to install such work; that every applicant for such a license be asked to prove a bond of not less than $1,000 as a guarantee with the local board of health, and further that heating and ventilating systems to be installed, be placed under the jurisdiction of the local board of health, and that plans of such systems be placed in the hands of such boards of health to be certified before being installed; that the amount of radiation and location of same be shown on plans, along with the size of furnace to be installed and rating of same. This rule should also be made to apply to warm air furnaces as well.

There should also be some reasonable provision made in all heating systems for an adequate amount of humidity. This latter being every bit, if not more important than either the heating or the ventilating.

There should also be some law to prevent repairs to sanitary installations being done, if not done in accordance with the very latest practice, and in case defective work be found out, the offender should be convicted and his license as either journeyman or employer be suspended for a certain period.

The trade should urge very strongly that a practical man be placed upon every board of health, whether city or county.

There should be an annual inspection of all sanitary, heating and ventilating systems and a proper report as to their condition, this latter inspection would ensure that the law governing such work is being carried out.

Cultivate the Country Trade

THERE never was a better time than the present for the hearty and systematic cultivation of the country trade. The facts are that the farmers have not suffered from the present financial stringency to any appreciable degree. During the last two decades the farmers have not secured any sudden wealth. At the same time the mortgage has been lifted from the majority of homesteads and the great proportion of farm holdings so improved that they are not the same class of farms as were the rule during the last quarter of the last century. The farm home is quite the rival of the better class of urban homes in both comfort and equipment.

While the purchasing power of the farmer is almost unimpaired, and often even improved, the quality of the merchandise he buys compares favorably with the city customers. Indeed the majority of merchants report that while often the grade of clothing, for instance, is rather heavier, and the style, perhaps, of a more staple order, the purchasing is on quite as substantial a basis.

A HAPPY New Year to all our readers.

• • •

THE clouds are beginning to roll away.

• • •

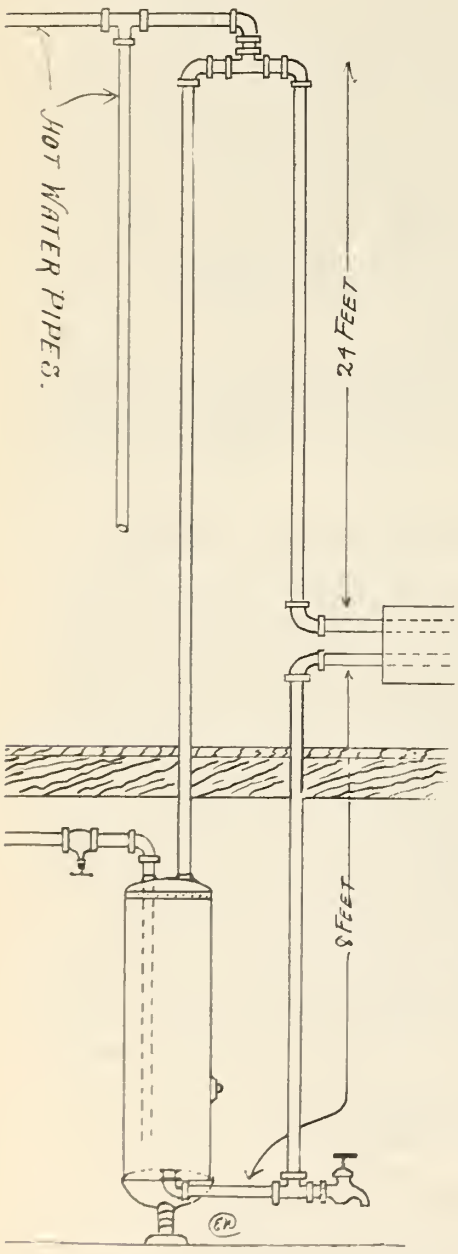
THE man who profits by the mistakes of the past is on the right road to success.

Domestic Hot Water Supply Problems

A Series of Articles Dealing With the Problem of Hot Water Supplies, Range Boiler Connections, in Several Forms and Methods Adapted as a Means of Heating Water Under Various Conditions.

ONE of the most puzzling problems, in many instances, to the sanitary and heating engineer both young and old is that of heating a range boiler in the basement when the range is situated on a floor above. Many a time it has been found that to place the range boiler in the kitchen would either necessitate placing the boiler on one side of a door and the range on the other, or many a time would spoil the appearance of a wall, and prevent the kitchen cabinet from being located in what would be termed the proper place for it. To-day there are more cases of there being too much hot water in the range boiler than otherwise, therefore it would be quite within reason to place the range boiler in the basement. Of course peculiar provisions must be made to make the range water-front do fair duty. Fig. 1 shows how such an installation should be made. It will be seen that Fig. 1 gives height of rise from top connection from range water-front, as well as the drop for the lower pipe. These figures are not hard and fast measurements, but the very least rise which the top pipe should be given is twice the height of whatever drop is necessary for the lower pipe. The higher the upper pipe is carried the better service will be gotten. The height of the upper pipe may be materially lowered by suspending the range boiler to the ceiling of the basement as shown in Fig. 2 and no special tappings are required in the range boiler, other than those found in the common commercial boiler. By suspending the boiler as shown, the lower pipe may only be about four feet from the bottom connection, and in that case anything above eight feet would give fairly good results, though twelve feet would greatly improve the system. Of course the reader must not expect to get as much hot water by adopting this method of installation, as if the boiler were located on the same floor as the water-front, but, as we said before, there is oftener more water got from the ordinary water-front than is necessary. It may be asked why this is the case, the reason is that most kitchen ranges are made as cooking ranges, and the fire-box must be of such size and design as to warrant the efficiency of the oven and general cooking, this requires such a large surface next to the oven, the opposite side of the fire-box is taken up with the water-front, the water-front, too, must always give enough hot water, or the ordinary housewife is apt to condemn the whole range. Thus it will be seen that the manufacturers of kitchen ranges take no chances with the water-front being too small.

(Continued in next issue.)



Showing how range boiler in basement may be heated by water from kitchen above.

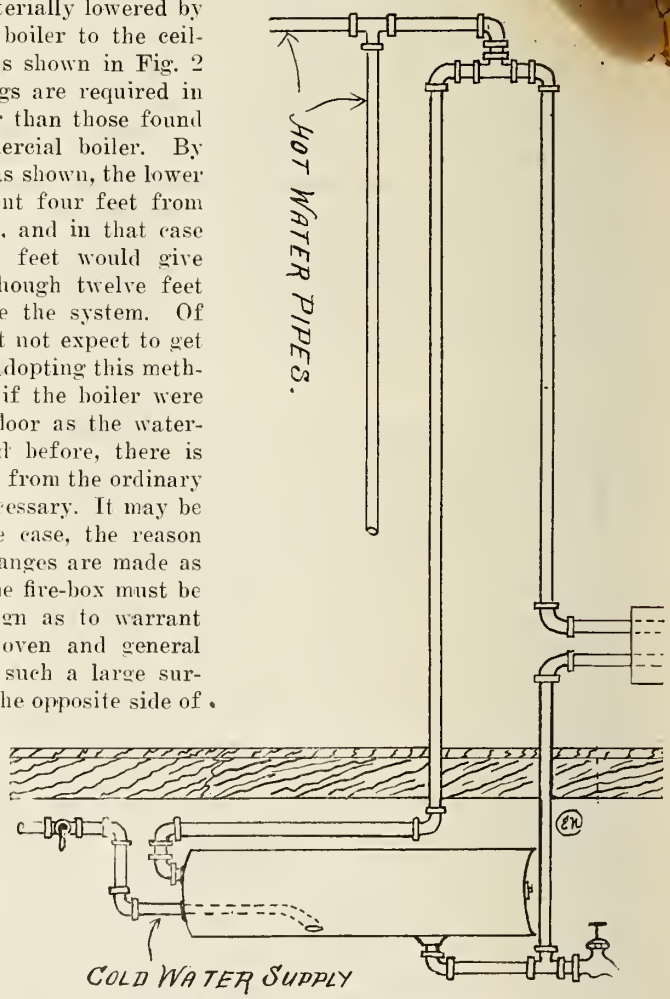
NEW BOOKS.

Vapor Heating Systems.

The Vapor Heating Co., of Philadelphia, are issuing a very interesting book describing their Broomell vapor system. It is beautifully illustrated, and contains quite a number of designs of heating systems. Those of our readers who wish to possess one of these books may do so by applying to the above address.

Rapid Earth-Work Calculations.

New time-savers on hydraulics and earthwork is the title of a very interesting book by C. E. Housden, late P.W.D. India. This book contains practical sections, drawings, plans of earth work, and the most up-to-date tables and data which engineers can procure. Further particulars can be had by writing to the publishers, Messrs. Longmans, Green & Co., Paternoster Row, London, England, or to Book Department, MacLean Publishing Co., Ltd., University St., Toronto.



Showing range boiler in basement suspended to ceiling.

"Shop Economics"

Showing Where Savings Could be Made, Where the Boss Would Save, Journeyman Earn, and Helper Learn, by Adopting the Right Method at the Right Time.

SPEAKING to one of our readers the other day, he remarked that the articles entitled "shop economics," were very interesting and he related a trouble which had cost him many a dollar during the year. Here's the story, which is only one, but is told as an illustration:

Last spring I was asked to tender [illegible] heating job which was the biggest [illegible]d ever had up to that date. I was [illegible]unate enough to get it, and needed [illegible]pe threading machine and cutter, so [illegible]t a rush order telling the jobber to [illegible] them by express. They were for [illegible]nd threading pipe from 2½ to [illegible]. After a delay of four days I [illegible] a letter to say that they had the [illegible] in stock and would express it [illegible], but that the cutter would have [illegible]e shipped from the factory. Imagine [illegible] feelings when the tool came along [illegible]ut no cutter. I wrote a fierce letter and in my remarks happened to say that I would not pay the express charges seeing that the cutter did not come along with the threading tool and was no use to me until the cutter arrived, and lo and behold if the jobber didn't send the cutter by freight. It took two weeks for those tools to get here, 'some rush.'

"Well, Mr. Editor, if you were to read the letters which passed between me and the jobber, you'd have enough dope to keep you going for months."

There's the story, readers.

Now, here is a case which requires a little discussion and as we stated before is only one of the many instances which happen every year. It was a case of "much hurry, less speed." If in the first place a carefully written order had been given, stating that these two machines were required together and that one was of no use without the other, the chances are the jobber would have acted differently, but there was no excuse for the cutter being sent by freight. Simply because a customer gets excited is no reason for a shipper to lack common sense. The jobber was not supposed to know that the customer had no cutter, but knowing afterwards that such was the case he should have taken good care to see that the cutter was shipped express prepaid, and a thousand to one the trouble would have been smoothed over.

The ordering of insufficient quantities of fitting is a source of needless expense which has to be borne by every job. Only the other day a heating engineer found he was shy of an 1¼ x 1 inch radiator bushing. He had been making over several radiators and had the job all ready for putting the heat on and wanted to get some money on account. He wired for the bushing (25c.), lost two days' time. Owner of the property wanted to see the heat on before he'd pay a cent, but had to leave town before the bushing arrived. If our heating engineer had given a little thought he could easily have put in a full size right and left nipple and valve, and bushed the bottom opening of the valve, got a draw on his account and been money in pocket. Another case came before our notice some time ago where a small order for fittings was shipped out, lacking about ½ a dozen of the heaviest fittings and the whole order only amounted to a little over $6. The balance of the order was sent express and cost 60 cents express, the first part of the shipment cost 40 cents, making the total cartage charges $1. About 17 per cent. of the value of the purchase. We have often been asked who should bear the cost of these short order shipments, and while we do not wish to be looked upon as unreasonable, we would state our opinion that when an order is not shipped complete and the goods are a staple line, the shipper should pay any extra charges involved. Further, we know that the shipper can save a lot of worry for the sanitary and heating engineer by promptly informing him of the shortage. The case first mentioned about the pipe threader and cutter, only required a little thought. Knowing that the machine was laying at the customer's shop and was no use until the cutter arrived was sufficient to indicate to the shipper the necessity for the cutter to be shipped express prepaid.

These small express and freight charges amount to a big sum in the course of a year and it would surprise our readers if they were to keep an account of them separately. Telegrams and long distance phone messages, postage, express and freight charges are accounts which are small in themselves, but they soon mount up. Not very long ago one of the craft was prevailed upon to look over his stock and replace all shortages. He was asked to keep his stock at a certain amount and order regularly. He found that by so doing he could cut down his expenses to almost half, in spite of the fact that his business nearly doubled during the period of one year.

Another instance came to our notice not very long ago. A certain sanitary and heating engineer had six large contracts all going on at once. Approximate orders were sent out for goods. On the completion of the jobs, it was found that over one thousand dollars worth of goods were returned to the shop, which actually amounted to 5 per cent of the whole value of the six jobs. This sanitary and heating engineer has to pay for this material and will have it on hand all this coming winter, he is having to pay interest on the money, or must charge it to overhead expenses. There has been a certain amount of teaming charges to pay, the storekeeper will have to handle this extra stock, it will be depreciated more than 5 per cent. because of having been thrown around the buildings during time of installation, in fact we venture to say that no less than a 15 per cent. loss will be involved on that thousand dollars worth of stock. This kind of trouble could all be overcome, if more care were taken in estimating, if proper plans were prepared, and goods ordered accordingly.

THINKERS' KINKS.

Execution of a work is better than a bundle of excuses.

* * *

There is nothing like hard work to make optimisms come true.

* * *

Always take the short cut when it brings you to the same goal.

* * *

The young man with initiative is the man who does things differently.

* * *

It is in your own interest to watch the leaks of the store of your employer.

* * *

When you put your thinking cap on, you can see all sorts of improvements to be made.

* * *

For a few brief moments the Germans thought that their methods were being imitated, and that the Highlanders were women being driven in front of the army.

The town of West Vancouver, B.C., is calling tenders for work in connection with the proposed waterworks system. H. McPherson is the engineer.

The Principle of Elbow Pattern Developing

A Complete Course, Treating in a Simple Way, the Art of Elbow Pattern Developing. Specially Written for Those Who Have Only Received a Limited Geometrical Education.

By EDWIN NEWSOME

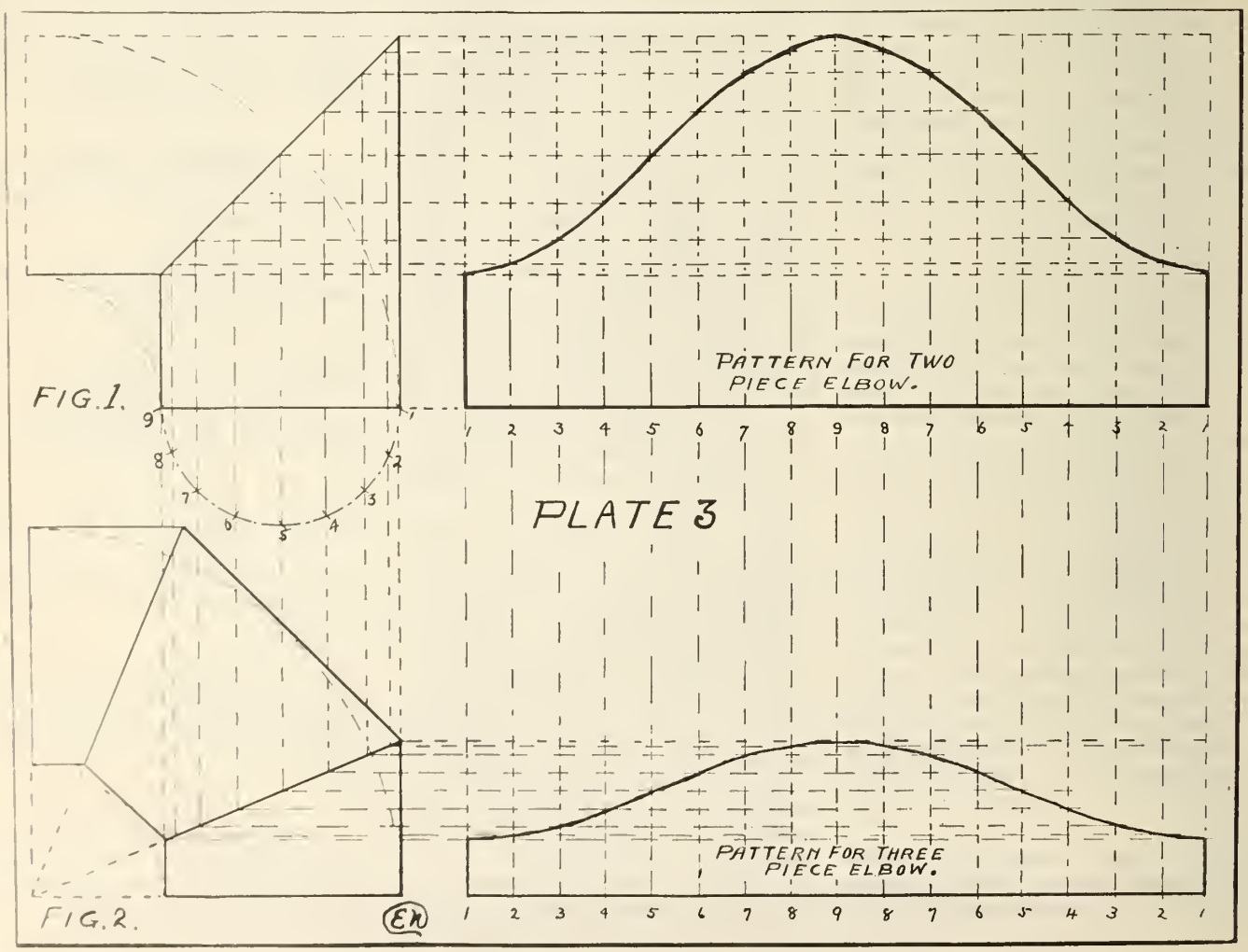
IN ARTICLES 1 and 2 of this series we have simply taken up the methods required to properly develop the elevations of 2, 3, 4, 5 and 6 piece elbows, showing the necessary mitres for each piece, as well as the degrees required from which to develop the patterns. Plate B shows half plan and full elevations of a two-piece and three-piece elbow, as well as the patterns.

For the sake of conserving space, we show in Fig. I. the full elevation of a two-piece elbow and half plan, using the same half plan for the three-piece elbow. To develop the plan, first determine the diameter of elbow, and centre it, then take compass and draw a half circle as shown in Fig. 1, next divide the circle into equal parts 1, 2, 3, 4, 5, 6, 7, 8, 9. These are known as stretchout measurements. Next draw a line as shown at base of pattern Fig. 1, and transfer the figures 1, 2, 3,, etc., till 9 is reached and reverse the order of figures 8, 7, 6, 5 ,etc. This will give the exact diameter of the elbow. The next step is to determine the mitre. Having done so, extend the dotted lines upward from 1, 2, 3, 4, 5, 6, 7, 8, 9, until they intersect the mitre. Next erect dotted lines as shown on pattern piece from 1, 2, 3, 4, etc., up to a point higher than highest mitre point in elevation.

Now take the square or straight edge and extend horizontal lines, as shown by dotted lines from point on mitre where the vertical lines have intersected, until each and every vertical line is cut. Next take a scratch awl, if the pattern is being developed on metal, and scribe the line shown, where the vertical and horizontal lines meet. In some shops where patterns are held ready for use, the one piece of metal is made to answer for various patterns by simply punching points through the metal. For instance, if the two piece pattern is developed first, the three piece may be developed next and small points punched through at different intersections. When patterns are being developed, it is good practice to always allow metal for locks and seams. Another thing not to be forgotten is the male and female end, the most common practice is to cut off sufficient to allow the small end to enter the big end, and to rivet the big end close to the edge on the seam and the small end, say about 2½ inches up the pipe, according to the amount of lap allowance.

Turning to Fig. 2 it will be seen that the same course is to be repeated when developing a three piece elbow except that when using the pattern for the two piece elbow, both the pieces are alike, whereas in the case of the three piece elbow, there are two pieces both exactly like the pattern and one piece made up by turning over the pattern and making two mitre pieces on each edge.

(Sontinued in next issue.)



A Person and a Personality

SENECA, a great Roman writer and philosopher, once said, "We complain that life is too short, yet we live each day as if it were a thousand years."

The life of the average individual is principally occupied in rendering excuses, making explanations, and in listening to idle gossip.

The average man makes but little of his chances, which assertion is proved by the fact that a few men in one day of eight hours often accomplish more than many men in a lifetime of seventy years.

Life is simply a matter of concentration. *You are what you set out to be.* The things you read to-day and the things you think to-day are the things you become to-morrow. You are a composite of the things you say, the books you read, the thoughts you think, the company you keep and the things you aspire to become.

So, then, here is a recipe for improving the individual and evolving your life into success. Time is your only asset. Each moment is a golden treasure and the way you spend it shapes your life as an individual.

If you would simply devote thirty minutes of each day to the study of some splendid idea, to the improvement of your mind, in obtaining a more accurate knowledge of your business, in studying the thoughts of some great man who has left the world better because of his having lived, in search of the secret of the success of great business men, you would in ten years' time evolve into a giant of intellectual strength with power to follow any plan or idea to final and positive success.

That is what you can actually do through the right investment of thirty minutes each day.

Time knows no prejudices, makes no promises, keeps no records and asks no questions. You are here for a purpose and each moment you spend foolishly or frivolously is lost for all time—simply thrown into the waste-basket of indifference. You come into this world from an eternity of which you know but little, watch the hour hand on the face of time for a little while and return to that eternity from which you have come.

Unless you know the value of each moment as an investment, each day that passes is only a stumbling block that sends you blundering on into the indifference, helplessness and decline of old age.

Then the question is—what are you going to do with each hour and what are you going to do with life? Are you going to drift through its wealth and beauty, satisfied with your inefficiency, incompetency, idleness and ignorance? Are you going to leave untouched the treasures of the world in which you live? Are you going to betray yourself and your chances?

Are you going to remain content with your own limited knowledge when you can keep in touch with the great thoughts and ideas of the great men who have influenced the world? Are you going to bury your head in your desk and shut out the light of experience and the success of other men?

In other words—are you going to be a failure and in the evening of life go down the other side without having accomplished some great and splendid thing? Are you going to use these thirty minutes each day, to know more, to learn more and to understand? It is up to you.

Opportunity is pounding a perpetual tattoo on your door and follows you with a club from the time of your rising to the time of your retiring. The question is—are you to be a *person or a personalty?*

The way you invest this half hour is going to decide, and your life's work will say if you have been a success or if your life has been a travesty—a mockery filled with idleness, indifference and uselessness.

Do you believe in your work, in loyalty to your employer, in devotion to your business? Do you believe in honest service, in honest thought, in the divinity of the thing you do or the thing you sell? Do you intend to be an individual or a nonentity? As a man it is absolutely and entirely up to you. Are you going to get busy and when do you expect to begin?

Efficiency

Practical Course for Sheet Metal Workers

Article No. 8 of Series

By CHARLES SEIVERS

Fig. I.

To find the centre of a given arc.

Let A-B-C be the given arc, as shown in Fig. I. Draw any chord, as D-F. Bisect the chord D-F by the line G-E, cutting the arc at B, and join D-B.

At D make an angle as B-D-H, equal to the angle formed by the outline D-B-E, and extend the line D-H to cut the line G-E.

The point where the line D-H joins the line G-E is the centre of the given arc.

Fig. 2.

To draw a circle of a given radius, which circumference will pass through two given points.

In Fig. 2, let A and B be the given points, and the line R the given radius.

With A and B as centres, and with the line R as a radius draw two arcs to intersect as at C. With C as a centre and using the same radius draw a circle.

The circumference of the circle will pass through the given point.

Fig. 3.

To draw a circle whose circumference will pass through three points not in a straight line.

In Fig. 3, let F-G and H, be the three given points, draw lines joining F-G and G-H, and bisect these lines by E-C and D-C. The point where these two lines join is the centre of the circle with this point at C as a centre and a radius C-F, draw a circle.

The circumference of the circle will pass through the three given points.

Fig. 4.

On a given line to construct a regular heptagon. In Fig. 4 let A-B be the given line, extend the line A-B out to C. With A as a centre, and A-B as a radius, draw a semi-circle cutting the line A-C, and divide the semicircle into the same number of parts as there are sides in the polygon, in this case a heptagon, into seven parts, as shown by the figures 1-2-3-4-5-6-7.

Draw a line from A through the second division as A-2. Then draw a circle to pass through B-A and 2. To find the centre required bisect the lines 2-A and A-B as shown at E and D, joining each other at F.

With F as a centre and F-B as a radius draw a circle to pass through B-A and 2. On the circumference set off the distance A-B the required number of times (7). Then draw lines connecting the points obtained as A-B-G-H-K-L and 2, the figure thus formed is the required heptagon.

Fig. 5.

To erect a pentagon within a given circle. In Fig. 5 it is required to erect a pentagon within the given circle A-F-D. Draw a diameter as A-B. Divide the diameter A-B into the number of parts required as in this case 5.

With A and B as centres and A-B as a radius draw arcs cutting each other at C. Draw a line from C through the second division, 2, on the diameter, extending the line to cut the circumference at G. draw a line joining A-G on the circumference set off the distance A-G the required number of times (5) A-G-F-E-D, draw lines connecting the points outlining the figure required.

While a heptagon and pentagon are shown in the Figs. 4 and 5 the polygon may be of any number of sides as required, but the problem is carried out in a similar manner, that is divide the semicircle or diameter into the required number of parts and use the second division or point.

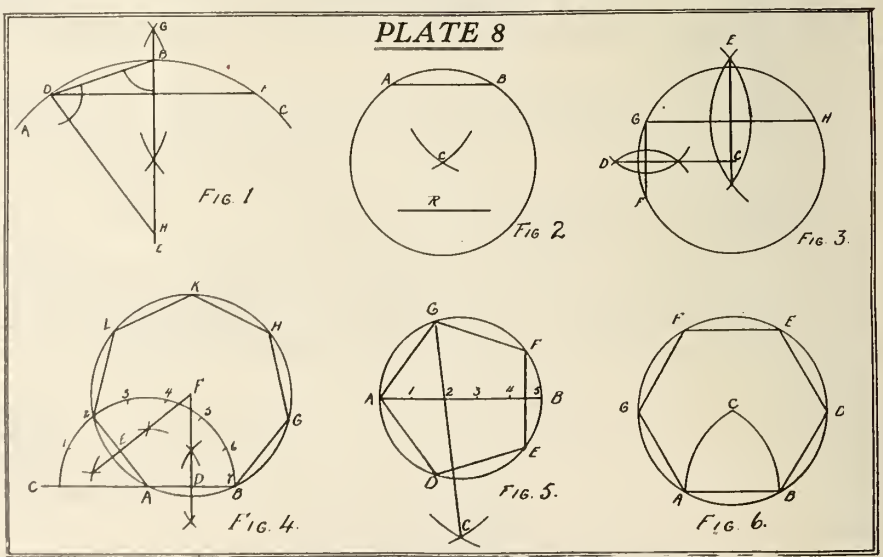
Fig. 6.

To construct a regular hexagon on a given line.

In Fig. 6 let A-B be the given line. With A and B as centres and a radius equal to A-B draw two arcs cutting each other at C. With C as a centre and with the same radius draw a circle. On the circumference of this circle set off the distance A-B the required number of times (6) as shown by A-B-D-E-F and G draw lines connecting these points outlining the figure required.

NOTICE TO READERS.

We have quite a number of readers who send in questions to be answered but fail to give us their address. We would like to receive addresses as a guarantee of good faith, also to enable us to answer their question privately. For instance, we had several questions which showed the answer was urgent, because of its very nature, and in such a case the questioner has had to wait in many cases over two weeks and more, and often a question is such that it requires more particulars. Therefore we respectfully ask our readers to give us their full address, which is not necessarily for publication.— Editor.



In developing the above problem we suggest that the student make his drawings four times the size of the above sketch.

Sanitary Drainage Improvements.

The city council of London, Ont., has th[illegible]orized the immediate construction of [illegible]ditional storm and sanitary sewers, to [illegible] approximately $14,000, to relieve the [illegible]ployment situation.

* * *

2. [illegible]ollowing by-laws will be voted on [illegible] ratepayers of Ottawa, Ont., on [illegible]:—$420,000 for water mains; [illegible]r intercepting sewer; $100,000 [illegible] abattoir, and $50,000 for an in-[illegible].

* * *

The contract for a filtration plant for the town of Orillia has been awarded to the International Filter Co. of Chicago, at the price of $1,465.

Up-to-Date System for Gananoque.

W. F. Martin has been awarded the contract for heating, plumbing and gas fitting in the new Nokomis Lodge, for Mr. W. H. Nichols. This contract includes a very elaborate system of heating and plumbing. Some ten bathrooms are being installed, and the building throughout will be heated with the Mouat-Squires graduating vapor system.

Passed On.

Samuel Birch, aged seventy-four, of the firm of McKelvey & Birch, plumbers and tinsmiths, Kingston, Ontario, dropped dead in his store, on Saturday morning, Dec. 26th. Mr. Birch formed a partnership with John McKelvey fifty-three years ago, and their business all this time had been conducted in the present store on Brock street, with the exception of three years. He had been associated with Mr. McKelvey for sixty-three years. His wife, four daughters and three sons survive.

W. E. Bruce Urges Better Sanitation Laws.

A determined plea for sanitation in the various factories and places of labor in the province was pressed upon the Ontario Government to-day as a vital point in the lengthy list of recommendations which the Trades and Labor Council brought to the attention of the Cabinet.

Members of the deputation, which represented the different manufacturing centres of Ontario, waxed warm in declaring that helpful legislation now on the statutes was not being lived up to and that much more was needed. Conditions prevailing in Toronto, Hamilton and London plants were quoted as shocking, and it was pointed out that many of the workmen employed were forced to eat their meals in the midst of unhealthful and trying surroundings.

The first cause to be heard was that of the molders, presented by James L. Rip-

FRANK STINSON

ley. He appealed for bathrooms and cloakrooms to allow cleanliness and to ward off rheumatism and lung trouble. The inspection system could be jacked up so that employers would not always be apprised of the approaching visit. He also claimed that at least one inspector under the workmen's compensation board should be a molder.

"I can show you places in London where the plumbing system is disgraceful," declared W. E. Bruce. "Schools are being built in Ontario without any restrictions."

It was claimed that the ventilation of linotype rooms in the smaller cities was often very deficient.

The cupidity of property-owners in fixing up old buildings for habitation should also be taken in hand by the Government. Instances of destruction were quoted showing where the practice was to paper over old vermin-covered walls.

E. W. Odell, of Hamilton, urged, and Jos. Gibbons supported the establishment of lunch rooms in all foundries and stamp mills where gas and grime abounded. Now conditions were poor.

Joins Second Contingent.

One of the most popular salesmen in the sanitary and heating trade in and around Toronto has joined the second Canadian contingent. Frank Stinson, of Cluff Bros., after serving the trade faithfully for over 3 years decided to serve his country in another capacity. No young fellow has won the hearts of the members of the trade more fully than has Frank. One and all will miss him for a while, and having won glory on all sides in a commercial capacity, let us all join in wishing that he be given the opportunity to do likewise on the battlefield.

As a slight token of esteem his late employers and workmates had the pleasure of giving hi ma hearty hand-shake a few days ago and Frank was the recipient of a beautiful wrist watch. W. J. Cluff, his late employer, made the presentation. The Sanitary Engineer particularly wishes him God Speed and a safe return.

New Industry.

The Star Boiler and Radiator Co. has been incorporated at Ottawa, with a capital of $200,000, to manufacture all kinds of furnaces, radiators and heating apparatus at Montreal. Incorporators—Ulric Granger, Edouard Michaud and Charles Paquette, all of Montreal, Que.

New Bulletin.

The Detroit Lubricator Co., Detroit, Mich., are describing a full line of radiator valves in a 15-page bulletin, to hand. The principal features of this valve are dealt with fully and the various styles illustrated. Roughing-in dimensions are given for the various styles and sizes.

New Sanitary and Heating Goods

New Speco Air Moistener.

The Specialty Mfg. Co., of St. Paul, Minn., has recently brought out a new device for adding moisture to rooms heated with steam, hot water and furnaces, shown in the illustration.

The adding of moisture to heated rooms is strongly advocated by leading health specialists, and no heating system can be claimed to be sanitary if there is no provision made to moisten the atmosphere.

This moistener is made from galvanized sheet metal, the handle and hooks being of heavy galvanized wire, making them rust-proof and practically indestructible. They are attractively finished with gold bronze, which harmonizes with any radiator.

One especially valuable feature of this air moistener is the special wick, which

draws the water up from the reservoir, thus exposing it to the hot, dry air from the radiator. The air conveyers (openings in the side of the moistener near the top) also increases the efficiency of the device by directing currents of air against the wick, below the top of the reservoir.

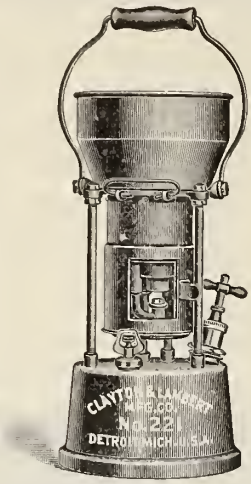
The wick is carried on a frame, and is readily removed for cleaning, or when partially removed it serves as a funnel while filling the moistener with water.

They are neatly packed 1-6 dozen in a pasteboard box and shipped, ½, 1, 2 or 3 dozen in fibre board shipping cases, each containing suitable supply of circulars and display cards.

Write to above address for folder.

Two New Kerosene Torches and a Kerosene Fire-Pot.

An improved Kerosene Fire Pot No. 221, and a quart and pint size kerosene torch Nos. 96 and 95, respectively, have recently been placed on the market by the Clayton and Lambert Mfg. Co., Detroit, Mich. It is claimed by the makers that these new torches and fire pot are of strongest possible construction and embody improvements designed to give the user the maximum service and efficiency. The burners are made with powerful generators that superheat the kerosene gas



No. 221 Kerosene Fire Pot.

before it is burned, producing perfect combustion of the fuel and enable the user to secure a clear blue flame free from smoke and odor and the highest degree of heat. All parts are easily accessible for cleaning should they ever become clogged from impurities in the fuel and a cleaning needle is supplied free of charge. The automatic brass pump fitted into the tank supplies all needed air pressure quickly. The filler plug at the top of the tank is made with an air-valve screw which releases the air-pressure and extinguishes the flame. The No. 221 Kerosene Fire Pot, herewith illustrated is made with heavy gauge seamless drawn steel tank with bottom and all fittings

No. 96 Clayton & Lambert Torch.

welded in, not soldered, making it practically indestructible. The shield is also drawn from one-piece steel. The No. 96 Torch illustrated is of brass, quart size and No. 95 is similar, but smaller. It is claimed that these new kerosene tools give excellent service and satisfaction for all indoor work and also for outdoor use under severe conditions of wind and weather as the burners are practically windproof. To all those interested complete information will be supplied by the makers, the Clayton & Lambert Mfg. Co., Detroit, Mich.

John Markum Dead.

John Markum, the oldest master plumber in Montreal, passed away recently. He was born in 1842, and retired from business six years ago. He is survived by four sons and two daughters.

NEW BOOKLETS.

Automatic Vacuum Steam Heating.

The Eddy Engineering Co., Alma, Michigan, are distributing a very interesting and illustrated folder describing the Eddy system of heating, copies of which may be had on applying to above address.

Atmospheric Heating Systems.

The American District Steam Co., North Tonawanda, N.Y., are issuing a very fine bulletin, entitled "Atmospheric System of Steam Heating, No. 133." It not only contains a fine array of illustrations describing their own goods, but also very useful information of general value to every heating engineer. The science of heating has made such great progress, that it is only by keeping in close touch with the various manufacturers of specialties that the average engineer can become acquainted with what is taking place in his line. Write to above address and procure a copy of Bulletin N. 133 while they last.

Habits and Has Beens.

Does the acknowledged failure ever reflect upon the fact that his failure becomes evident simultaneously with the admission of it, never before? No man is a failure who is up on his hind legs and fighting against fate, men or money, however one-sided the battle is. Even though he loses, he wins. A paradox? Quite so, but a truthful one, for the only enemy that can really defeat a man is himself, his inner consciousness. As long as his spirit is indomitable, as long as he has the desire, even the ability to punch is gone, he is still a may be, and it is nothing against him that he is a Has Been.

Get the habit—the habit of good cheer and game fighting. Bad habits of thoughts are as insiduous as those of the appetite, and they, and they alone, can keep a man a Has Been.

NEW CANADIAN PATENTS

No. 153,696.

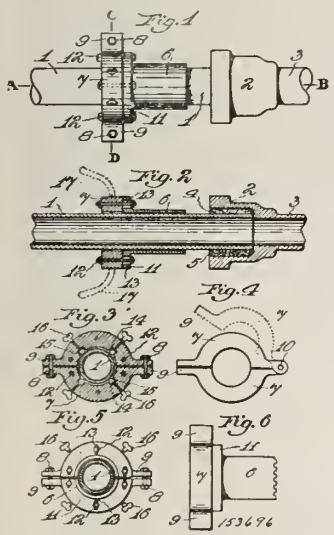
Clifford Toon, Sr., Christchurch, New Zealand, 10th February, 1914; 6 years. Filed 27th August, 1913. Receipt No. 228,371.

Claim.—1. Means for the purpose indicated comprising a circular tool constituted by two or more members adapted to be secured together as as to fit around the pipe or rod to be jointed, such tool being adapted to be reciprocated longitudinally on said pipe for the purpose of causing the operative end of the tool to deliver a succession of blows to the packing material around the joint.

2. Means for the purpose indicated, comprising a circular tool constituted by two or more members adapted to be secured together so as to fit around the pipe or rod to be jointed, such tool being adapted to be reciprocated longitudinally on said pipe by means of a dolly or driver secured thereto for the purpose of causing the operative end of the tool to deliver a succession of blows to the packing material around the joint.

3. Means for the purpose indicated, in combination with a circular tool adapted to fit around the pipe or rod to be jointed and to be reciprocated thereon by means of a dolly or driver so as to cause the operative end of the tool to deliver a succession of blows to the packing material of the joint, of means comprising a plurality of anti-friction elements secured within the hore of said dolly and adapted to bear upon the periphery of said pipe.

4. Means for the purpose indicated, in combination with a circular tool adapted to fit around the pipe or rod to be jointed and to be reciprocated thereon by means of a dolly or driver so as to cause the operative end of the tool to deliver a succession of blows to the packing material of the joint, of means whereby the bore of the dolly and tool may be adjusted to accommodate pipes of varying diameter.



153.696. Means of Caulking Lead Joints in Iron Pipes.

* * *

No. 154,811.

Robert F. Metcalfe, Erie, Pennsylvania, U.S.A., 31st March, 1914; 6 years. Filed 14th October, 1912. Receipt No. 215,470.

Claim.—1. A water heater of the character described comprising a water containing header having two separate water compartments therein, outlet ducts leading from one compartment through a series of heat generating coils into the other compartment, water discharge actuated heat controlling means operating to regulate the heating means upon the discharge of hot water from the heater.

2. A water heater of the character described comprising a header having two separate compartments therein, a plurality of water conductors connecting said compartments, heat producing means located adjacent to said conductors, and water discharge actuated heat controlling means operated to govern the heat producing means.

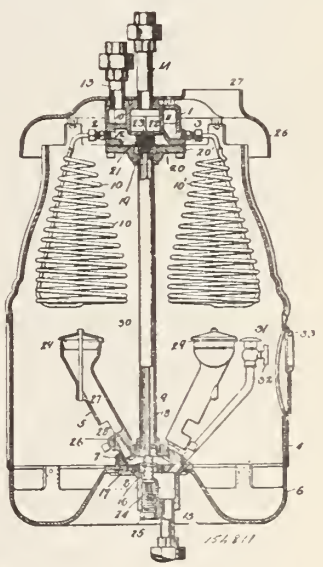
3. A water heater of the character described comprising a header having two separate water compartments therein, a plurality of discharge ducts leading from one compartment through a plurality of water conductors leading into the other compartment, heat producing means actuated by the change of static pressure within the discharge compartment.

4. A water heater comprising a tubular casing, a plurality of burners therein, a combustion chamber within said casing, a water chamber header having a primary and a secondary water chamber, a group of coils within the combustion chamber having one end arranged to receive water from a primary chamber and the other end to discharge into a secondary chamber, fuel gas supplying means adjacent to said burners actuated by the movement of the hot water discharge, substantially as described.

5. A water heater comprising a tubular casing, a water container having two separate water chambers, a plurality of burners within said casing, a combustion chamber located above said burners, a heating coil group located within said combustion chamber, the one end of each coil being attached to the one water chamber, having its other end connected to the other water chamber, fuel controlling means regulated by the movement of the hot water drawn from the heater, substantially as described.

6. A water heater embodying a base, a shell supported on said base, coils of tubing arranged within said shell having their ends connected to separate water compartments located in the top header, burners located below the coils of tubing, fuel controlling means actuated by the change of static pressure of water in the discharge chamber.

7. A water heater comprising a water container having an inner and an outer water chamber, a plurality of spirally-shaped tubes connecting said water chambers and extending into a combustion chamber; a flexible diaphragm forming one wall of the inner water chamber, a gas chamber below the water chamber, a valve attached to regulate the flow of gas into said chamber yieldingly held in retracted position, an outlet duct leading from the inner water chamber, a reciprocally disposed plunger operating to open and close said duct yieldingly held against the pressure in the inlet pipe, and mechanism becoming operative by the reduction of pressure in the chamber between the plunger and the outlet duct to open the gas valve controlling the flow of gas to the burner.



No. 154,811. Water Heater.

(Continued on page 34.)

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

Where Should Valve Be Placed?

Editor, The Sanitary Engineer: I have been having a great deal of conversation with several fitters about the valve on a hot water radiator, the question is this: Which connection should the valve be placed on, the feed or return? Please reply if possible in your next issue.—H.E.

It does not really matter which connection the valve is placed on. It is almost a universal practice to place the valve on the flow, but it makes no difference whatever, the writer would, however, prefer to place it on the return, in spite of old-time practices, because, as a rule, the valve on the flow is apt to cause a little more friction that an elbow, and a little friction on the return would not be as detrimental to circulation. On an ordinary overhead hot water system the valve should by all means be on the return branch and should be a full bore gate valve.—Editor.

What Size of Septic Tank.

Editor The Sanitary Engineer:

I have been very much interested in the discussion of septic tanks published in The Sanitary Engineer. Now there is one thing that was never made clear in any of the articles or sketches, and that is the depth and width of an ordinary size tank for, say, one toilet and bathroom, and the depth of the inlet from bathroom to tank, below the top of ground, also the outlet from tank to the drain tiles. Of course, where the cellar drain is to be connected to septic tank it would have to go down quite as deep in my opinion. What I would like to have is a rough sketch, if not too much trouble, of a septic tank showing the size and the depth of the inlet below the surface of the ground, also the depth of the tile to drain below the surface. I would appreciate this information very much if you can give me same.—J. M. K

When installing the piping of a house or any other building where fixtures are installed above the ground level, the soil pipe should be brought down to a level about 18 inches below the surface of the ground. The tank is best about 3 feet from the house, and should have about one foot of earth covering the septic tank cover. The cover should be of either cedar plank or cement. If plank, it should be made reasonably tight so that no moisture can percolate through into tank. (See Fig. 1.)

Referring to the size a tank should be: this is not determined by the number of fixtures to be used, but rather by the number of persons intending to reside in the building. Suppose, for instance, there is a family of five in a home. It will be necessary to make a tank allowing a cubic content of 3 cubic feet per person, counting from the bottom up to the level of the fluid when tank is full. For such a sized family a tank should be about 3 x 2½ x 3, and as a safeguard allow 10 per cent. or thereabout extra on to the whole cubic contents. There is no particular depth of tank required.

The amount of tile pipe to be [illegible] should be from 13 to 15 feet of [illegible] field tile pipe and laid as shown

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Finding Pipes by Electrical Meth[illegible]

Piping of various kinds such as [illegible] water, steam-heating, vacuum cleani[illegible] or compressed air, is often concealed within walls, generally under plaster, and when it comes to making repairs or replacing such pipes, their exact position cannot always be found without doing considerable damage to the wall. A recently-patented electric method for locating the pipes is simply a special application of the well-known induction balance principle. A convenient apparatus is made up consisting of two sets of coils placed on ends of a magnet bar. One set of coils receives alternating or vibratory current from a suitable sourse, and the other coils are connected to a telephone. The balance is first established so that no sound is heard in the telephone. When the device comes near the metal piping, this disturbs the balance and a sound is heard. It is thus an easy

Continued on page 34.

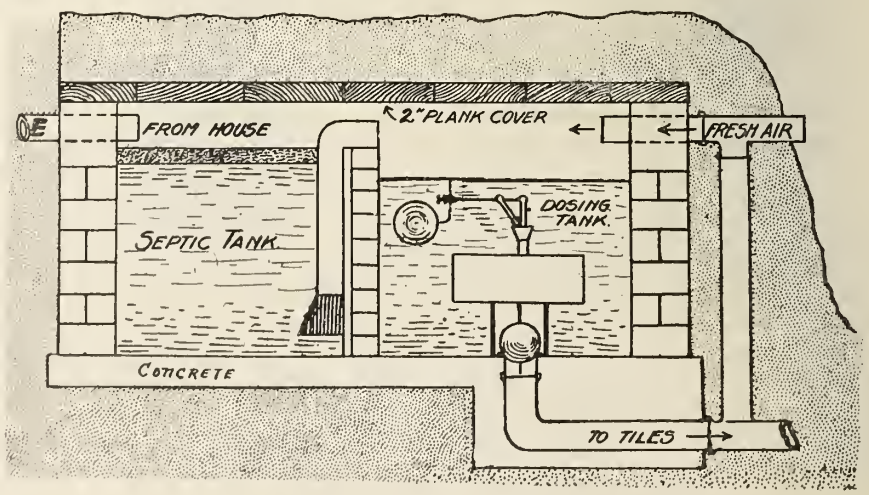
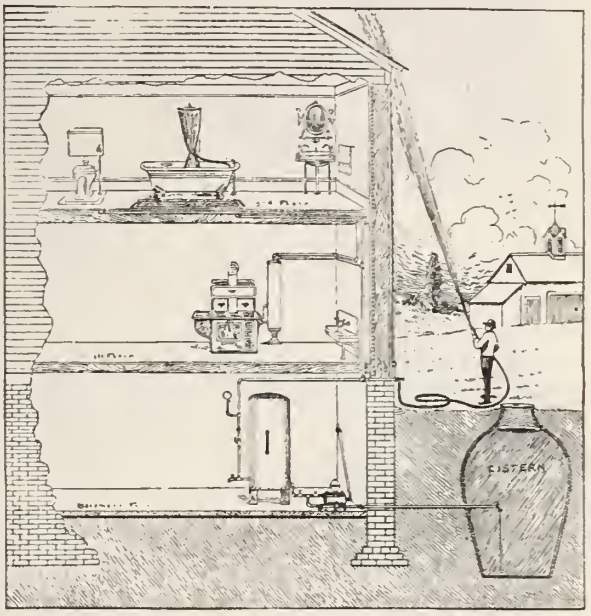


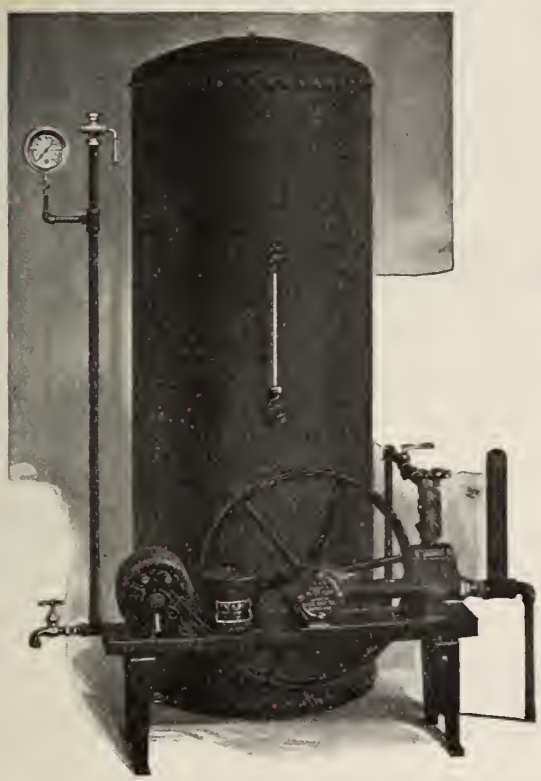
Fig. 1.

Empire Water Supply Systems

Show this cut to a farmer and ask him why he is not enjoying the same water supply and sanitary facilities as his city cousin.

For a little extra investment (on which the interest does not amount to more than the average city water rates) any suburban home can be equipped with a water supply and sanitary system, giving the same comforts as the most modern city bathroom.





We show here a system designed to meet the requirements of a country home, summer cottage, etc., where the usual house fixtures are to be installed and where electric power is available. The complete system includes: Tank, pressure gauge, water gauge, pump, electric motor and automatic switch relief valve, ½-inch stop, ¾-inch stop and waste, and ½-inch compression bibb. The pump automatically starts and stops at set minimum and maximum pressures, by means of the automatic switch. It is also equipped with an attachment for pumping air into compression tank as needed, and all working parts operate in a dust-proof crank case in a bath of oil.

Empire Manufacturing Co., Limited

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MANUFACTURERS OF AND DEALERS IN
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matter to find the exact position of the pipes and to reach them with less lamage to the wall.—Scientific American.

New Intake Pipe in Operation.

Port Arthur has now one of the best water supplies in Canada and the water where the intake is located is so deep and far removed from breakwaters, sewage drains and shipping that it has been pronounced by experts to be as pure as water in the lake can be. Chlorine will be needed only in small quantities as a precautionary measure when the wind is blowing from the south and sweeping the sediment from the harbor fronts into the northern part of the bay, and that little will be tasteless and odorless.

NEW CANADIAN PATENTS.

(Continued from page 31.)

No. 153,751.

Peter Lord and Eugene Launegrace, assignee of a fifty-five percentum of the interest, both of Montreal, Quebec, Canada, 17th February, 1914; 6 years. Filed 9th May, 1913. Receipt No. 224,229.

Claim.—1. In a valve, the combination with a casing having a valve seat therein, of a valve stem longitudinally movable in said casing, and having a leg engaging a vertical slideway in said casing, a valve adapted to engage said seat, ball and socket means connecting the lower end of said stem with the valve, substantially central of the height and width of said valve and of said seat when the valve is closed, and a rotary member having screw connection with said stem for imparting longitudinal movement thereto.

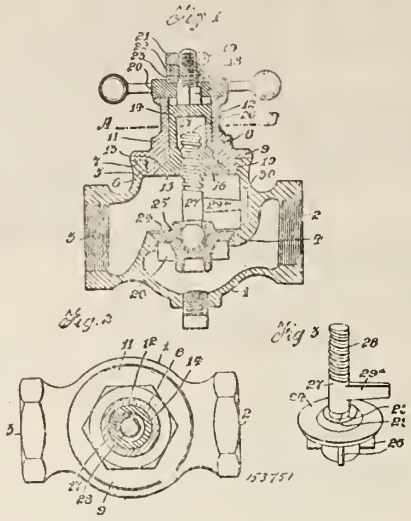
2. In a valve, the combination with a casing having a valve seat therein, a valve stem having a lateral leg intermediate of its length engaging a vertical slideway in said casing and having a ball-shaped lower end, a valve adapted to engage said seat and having a ball recess central of its height and width and of the height and width of the seat when the valve is closed, said lower end being secured in said recess, and a rotary member having an internal thread engaging an external thread on said stem for imparting longitudinal movement to the latter.

• • •

No. 153,827.

Eugene Lawrence Miller, Portland, Oregon, U.S.A., 17th February, 1914; 6 years. Filed 24th June, 1913. Receipt No. 226,060.

Claim.—In a device of the character described, the combination with a closet of a tank for containing decomposing liquids, said tank having an overflow duct and a drain near the bottom, said closet mounted to cover said tank, a screened receptacle placed in the opening of said tank, a shutter mechanism pivotally fixed in said receptacle and normally closing said decomposing tank, and a spring-held hand lever above said

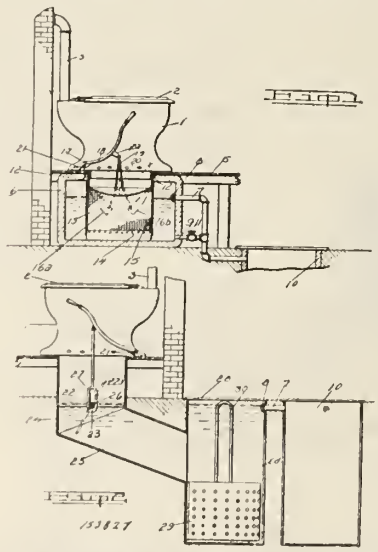


No. 153,751. Valve.

tank, said lever being connected to operate said shutter mechanism.

2. In a device of the character described, a tank open at the top, a receptacle placed in said opening and reaching to the bottom of the tank, means for varying the height thereof, a shutter mechanism pivotally fixed in said receptacle for closing it, manually operated means for opening and closing said shutter, a resilient member for normally retaining said shutter in closed position.

3. In combination an open top tank, a closure placed over said tank and having a bottom perforation the edge of which carries a flange extending into said tank, a receptacle placed in said tank and having a flange interposed between the bottom of the closet and the top of the tank, said receptacle made with openwork sides, an overflow duct in said tank, a spring-held shutter in said receptacle positioned directly above the surface of the liquid in the tank for normally closing the tank, and manually operated mean for opening said shutter, said means extending above the tank so as to be conveniently operated.



No. 153,827. Sanitary Closet.

4. In a device of the character described, the combination with a decomposing tank and a superimposed closet, of a screened receptacle for sediments placed in said tank, and means for tightly closing communication between said tank and closet, said closing means mounted to operate within said receptacle for normally closing it, and means operable from above the tank for actuating the closing means and so related as to cause the to pass through the liquids in the tank in opening and closing.

Toronto Inspector Died Suddenly.

Thomas G. Brown, plumbing inspector, connected with the Health Department, Toronto, for some years, died very suddenly in the early hours of Sunday morning, the 27th inst., at his home, Bloomfield Avenue, as a result of heart failure. He had gone to bed in apparent good health on Saturday night. At 4.30 a.m. Sunday, his wife was awakened by his moans and screams. She rushed to a neighbor's house for help, and on her return found her husband dead.

Mr. Brown was 28 years of age and was born in Toronto. He learned the plumbing trade with Mr. George Cooper, on Church Street, and had since been in business for himself, as well as being a city employee.

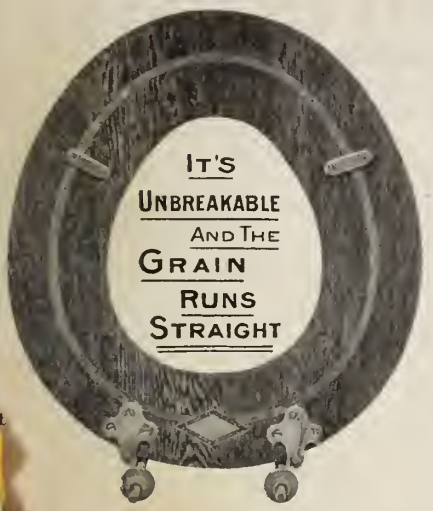
His wife and parents survive, he being the only son of Mr. and Mrs. John Brown.

Public Drinking to be Abolished.

The New York State Board of Health promulgated an order abolishing the public drinking cup and the use of the roller towel in public places and fixing sanitary rules to govern barbers, manicures, and chiropidists. The rules regarding the drinking cups and roller towels practically are the same as those enforced on inter-state trains.

The order requires that all instruments used by barbers, manicurists, and chiropidists be sterilized. Violation of the order will be a misdemeanor.

The latest requirements for slaughter houses have been sent to Dr. Perry, M. H.O., Mount Forest, by the Provincial Board of Health. The rules specify material used in construction and demand that each building shall be watertight, fly proof and well ventilated. Copies of the regulations may be had onapplication to Dr. John W. S. McCullough, Provincial Board of Health, Toronto.



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They are guaranteed not to split under any conditions. We invite you to subject them to a fair trial.

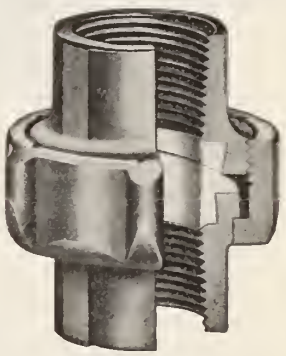
Will satisfy your trade where the usage is hard, and will appeal to the discriminating buyer of high-class goods, where reasonable prices are factors.

"Steelbound" No. 120

The Steel Bound No. 120 may be had in Plain, Golden or Quartered Oak, Gloss, rubbed, or rubbed and polished finishes. Imitation Mahogany in rubbed, or rubbed and polished—Piano finish.

THE ROCKWOOD UNION

is the ONLY pressed steel union having its two bronze seats properly clinched into place by pressure so enormous that they are practically welded together and cannot loosen or cause leakage. They are tested to 1000 lbs. per square inch.

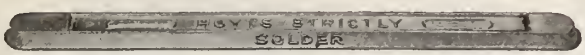


The Rockwood Cold-Drawn Steel Union.

The James Morrison Brass Mfg. Co., Ltd.

93-97 Adelaide Street West, Toronto

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



THE RESULT OF QUALITY

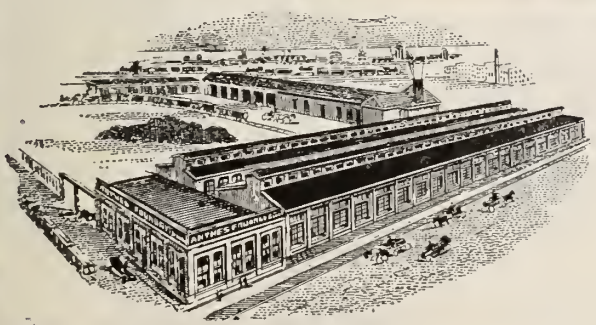
Babbitt Metal, Bar Solder, Wiping Solder, Wire Solder, Lead Pipe, Bar Lead, Traps, Bends, Copper, Tin and Antimony.

Let the goods prove their worthiness of a place in your stock. Send a trial order.

Hoyt Metal Co., Toronto, Ont.

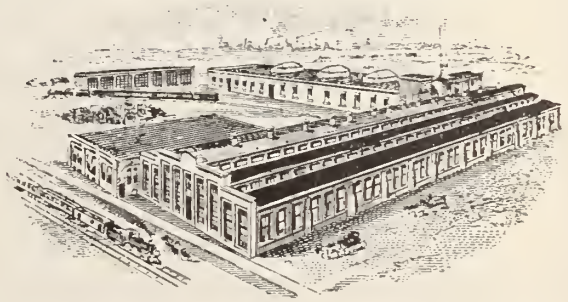
New York, N. Y.; London, Eng.; St. Louis, Mo.

TORONTO **ANTHES FOUNDRY LIMITED** **WINNIPEG**



MANUFACTURERS OF

CAST IRON SOIL PIPE AND FITTINGS



"When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."

ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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PERSISTENCY IN ADVERTISING

One stroke of a bell in a thick fog does not give any lasting impression of its location, but when followed by repeated strokes at regular intervals the densest fog or the darkest night can not long conceal its whereabouts. Likewise a single insertion of an advertisement—as compared with regular and systematic advertising—is in its effect not unlike a sound which, heard but faintly once, is lost in space and soon forgot.—*Printing Art.*

What Do You Earn?

Don't think us impertinent. We want you to put the question to yourself, and to supplement it with the further question, "Could you earn any more?"

Certainly you could, if your wasted evenings could be used to advantage.

Why not let The MacLean Publishing Company help you out? They will appoint you circulation solicitor in your district for MacLean's Magazine.

When you have tried it you may find it pays you well enough to give your whole time to it. That has been the experience of many before you.

The MacLean Pub. Co.

143-153 University Ave.
TORONTO

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

Sani-Flush

Makes Big Profit!

Sani-Flush will sell quickly because it rids the housewife of the most disagreeable household task—that of trying to keep the Water-Closet Bowl clean.

While it is easy to clean the visible part of the bowl, no acid, brushing, or scrubbing will affect the unseen trap or outlet, with result that the water standing in it becomes foul and offensive.

A little of **Sani-Flush** SPRINKLED in the water will soon loosen the incrustation so that it washes out when the closet is flushed.

A small quantity of this white powder used every day or two will keep the closet absolutely clean and odorless.

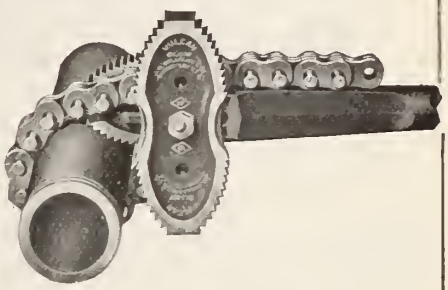
Sani-Flush won't craze the porcelain bowl nor injure the metal pipes or fittings, but it does keep the bowl clean without brushing.

Write for full particulars.

The Hygienic Products Co.
Dept. S.
118 Eighth Street, S. E.
Canton, Ohio.

Williams' Chain Pipe Tools

Send for free pamphlet



Improved "Vulcan"

With Double-Ended Reversible Jaws

"Two in one" at the price of one

—for Pipe, all sizes

"Agrippa" holding against.

Single Jaw for both Pipe and Fittings

Both with world-wide proof of efficiency and greatest worth.

Drop-forged, selected steel parts, machine tested, before shipping, to 2-3ds of advertised strength of chain.

Invaluable tools in all pipe work, for all pipe sizes.

J. H. WILLIAMS & CO.
Superior Drop-Forgings
77 Richards St.
Brooklyn, N.Y. City

THE SPECO AIR MOISTENER

"It's done by the wick."

Keeps the air moist and healthful. Promotes Health and Comfort. Prevents Furniture Drying Out. Every home heated with steam or hot water needs from four to one dozen. Supply this need and make A GOOD PROFIT. Well made and durable. Attractively finished and packed with suitable advertising matter to make a good display.

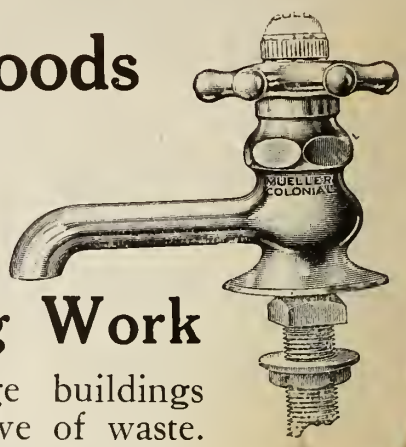
NOW IS THE TIME to sell them. Write at once for circular or tell us to send 1-3 doz. subject to your inspection, to be returned at once if they do not meet your approval.

The Specialty Mfg. Co.
ST. PAUL, MINN.

Every Time You Specify Mueller Plumbing Brass Goods

you give your client the best value obtainable for his money, the greatest amount of service and the most satisfaction.

MUELLER
Colonial Self-Closing
Basin Cock
(Patented)



D-12,902

Mueller Colonial Self-Closing Work

is especially desirable for large buildings because it is a constant preventive of waste. The Mueller Line includes all kinds of plumbing brass goods—recognized everywhere as a high quality product.

S.E.

H. Mueller Mfg. Co., Ltd.
SARNIA, ONT.
Send me further information on self-closing and prices.
Signed .....
City .....Prov.....

Made in Sarnia, Canada

H. MUELLER MFG. CO., LIMITED

SARNIA, ONTARIO, CANADA

Makers of High-Grade Plumbing, Water and Gas Brass Goods.

A NEW REAMER

"It's All in the Cone"

JOHNSON
IMPROVED DOUBLE CONE
BIBB SEAT DRESSER

For Re-seating Bibbs, Basin Cocks, Compression Valves, etc.
4 Cutters with each Dresser
Best and Simplest Tool on the Market
Finely Nickel Plated
Made by
WILLIAM JOHNSON
Manufacturer of
PLUMBERS' TOOLS
NEWARK, N. J., U. S. A.
Ask your jobber or write us.

Condensed or "Want" Ads.

TECHNICAL BOOKS

CLOTH BINDING. GIVES A COURSE OF practical instruction in the art of mechanical drawing, based on methods that have stood the test of years of experience. Includes orthographic, isometric, and oblique projections, shade lines, intersections and developments, lettering, etc., with abundant exercises and plates. Price, $1.00.

VACUUM CLEANING SYSTEMS, BY M. S. Cooley. A fine and authoritative treatise on the art of vacuum cleaning. Contains all the author's tests of vacuum-cleaning apparatus, history of mechanical cleaning, requirements of an ideal vacuum cleaning system, also chapters on carpet renovation, vacuum producers, separators, hose, fittings, etc. 244 pages, 6 x 9 inches; 105 illustrations, 20 tables. Price postpaid, $3.15. MacLean Publishing Co., 143-149 University Ave., Toronto.

ELECTRIC WIRING AND LIGHTING. BY Charles E. Knox, E.E., Consulting Electrical Engineer, and George C. Shaad, E.E., Formerly Associate Professor of Electrical Engineering, Massachusetts Institute of Technology, Professor of Electrical Engineering, University of Kansas. 195 pp., 170 illus. Cloth binding. A practical guide to approved modern methods of lighting by electricity and of installing conductors for the transmission and utilization of electricity for power, lighting, heating and other uses. Price, postage paid, $1.00. MacLean Publishing Co., Ltd., 143-53 University Ave., Toronto.

ESTIMATING. BY EDWARD NICHOLS, Architect. 128 pp., 22 illus. Cloth binding. Containing invaluable information for the use of Architects, Contractors, Builders, Plumbers and Heaters, Painters, Roofers, Cornice-Makers, and other workers in the building trades. This handbook tells just how to go about the task of making an estimate intelligently. Price, postage paid, $1.00. MacLean Publishing Co., Ltd., 143-53 University Ave., Toronto.

GENUINE
ARMSTRONG STOCKS
and DIES

FOR THREADING PIPE OR BOLTS

KNOWN, USED,
COMMENDED EVERYWHERE

PIPE MACHINES,
both Hand or Power

HINGED PIPE VISES

PIPE CUTTERS

PIPE WRENCHES

RATCHET ATTACHMENTS

BARD ADJUSTABLE
BUSHINGS

Manufactured by

THE ARMSTRONG M'F'G. CO.

317 Knowlton St.

BRIDGEPORT, CONN., U. S. A.
NEW YORK CHICAGO

WRITE FOR CATALOG

Classified Buyers Guide

Occasionally advertisements are inserted in the paper after this page has gone to press. The insertion of the Advertiser's name on this page is not part of the advertising order, but is inserted solely for the convenience of the reader of the paper.

Asbestos Goods.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Air Line Systems.
C. A. Dunham & Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
C. A. Dunham Co., Ltd., Toronto.
Gurney Foundry Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Jenkins Bros., Ltd., Montreal.
Kerr Engine Works.
Steel & Radiation Co., Ltd., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Boilers, Steam or Hot Water.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Toronto.
Warden King Co., Ltd., Montreal.

Boiler Feed Regulators.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, Etc.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Johns-Manville Co., Ltd., Toronto and Montreal.
Dunham, C. A., Toronto.
Empire Brass Mfg. Co., London.
James Morrison Brass Mfg. Co., Toronto.
Jenkins Bros., Ltd., Montreal.
H. Mueller Mfg. Co., Sarnia, Ont.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., Toronto.
Tallman Brass & Metal Co., Hamilton.
James Morrison Brass Mfg. Co., Toronto.

Cellar Drainers.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.

Closets.
Amherst Foundry Co., Amherst, N.S.
Empire Brass Mfg. Co., London.
Galt Brass Co., Galt.
B. O. T. Manufacturing Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Johns-Manville Co., Toronto.

Correspondence Schools.
Anglo-American Sanitary School.

Country Residence Equipments.
General Machinery Co., Ltd., Mulock Ave., Toronto.
National Equipment Co., Limited, Toronto.

Damper Regulators.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
Empire Brass Mfg. Co., Ltd., London.
Fittings, Limited, Oshawa.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.
Tallman Brass & Metal Co., Hamilton.

Ejectors for Sewage.
National Equipment Co., Toronto.

Enamelware.
Amherst Foundry Co., Ltd., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Ltd., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Ltd., Toronto.

Electric Pumping Machinery.
General Machinery Co., Ltd., Toronto.
National Equipment Co., Ltd., Wabash Avenue, Toronto.

Fittings.
Empire Brass Mfg. Co., London.
Fittings, Limited, Oshawa.
Steel & Radiation, Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., Ltd., London, Ont.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Co., Ltd., Toronto.
Mueller Mfg. Co., Ltd., Sarnia, Ont.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
Canadian Wolverine Co., Ltd., Chatham.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Warden King, Ltd., Montreal.

Garbage Burners.
Gurney Foundry Co., Ltd., Toronto.

Gasoline Engines.
National Equipment Co., Ltd., Wabash Avenue, Toronto.

Gas Mantles.
Hamilton Gas Mantle Co., Ltd.

Gas Water Heaters.
Gurney Foundry Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Generators.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
The E. S. Manny Co., Montreal.
Warden King, Ltd., Montreal.

Lead.
Empire Brass Mfg. Co., London.
Hoyt Metal Co., Toronto.
Tallman Brass Mfg. Co., Hamilton.
James Morrison Brass Mfg. Co., Toronto.

Mixing Valves.
Geo. Carpenter, Montreal.

Nipples.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
C. M. Kemp Mfg. Co., Baltimore.
Empire Brass Mfg. Co., Ltd., London.
Fittings, Limited, Oshawa.
Galt Brass Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallaceburg Brass Mfg. Co., Wallaceburg.
Warden King, Ltd., Montreal.

Oil Storage Systems.
National Equipment Co., Ltd., Wabash Avenue, Toronto.

Packing.
Canadian Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
Steel & Radiation, Ltd., Toronto.
Warden, King, Ltd., Montreal.
Steel Co. of Canada, Montreal.
James Morrison Brass Mfg. Co., Toronto.

Pipe Joint Compounds.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.

Pipe Threading and Cutting Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., New Britain, Conn.

Porcelain Ware.
Amherst Foundry Co., Ltd., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope, Ont.
Standard Sanitary Mfg. Co., Ltd., Toronto.

Pumps.
C. A. Dunham & Co., Ltd., Toronto.
National Equipment Co., Toronto.
General Machinery Co., Ltd., Mulock Ave., Toronto.
Cluff Bros., Church St., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Radiators.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

Radiator Fittings.
Fittings, Limited, Oshawa.

Radiator Traps (Steam.)
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
C. A. Dunham & Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Sani-Flush.
Hygienic Prodncts Co., Canton, Ohio.

Septic Tank Valves.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
National Equipment Co., Ltd., Wabash Ave., Toronto.

Solder.
Hoyt Metal Co., Toronto.

Steam Specialties.
Dart Union Co., Ltd., Toronto.
C. A. Dunham & Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.
The E. S. Manny Co., Montreal.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
E. S. Manny Co., Montreal.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Testing Plugs.
James Morrison Brass Mfg. Co., Toronto.
C. M. Kemp Mfg. Co., Baltimore.

Tools.
Armstrong Mfg. Co., Bridgeport, U.S.A.
Borden-Canadian Co., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tap & Die Co., Ltd.
Hall & Sons, Ltd., Brantford.
Nicholson File Co., Port Hope, Ontario.
James Morrison Brass Mfg. Co., Toronto.
William Johnson, Newark, New Jersey.
Williams, J. H., & Co., Brooklyn, N.Y.

Unions.
Dart Union Co., Ltd., Toronto.
Fittings, Limited, Oshawa.

Vapor Heating Systems.
C. A. Dunham Co., Ltd., Toronto.

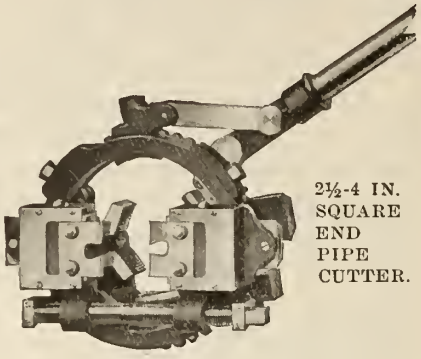
Vitro Tanks.
Cluff Bros., Ltd., Church St., Toronto.
Cluff Manufacturing Co., Ltd., Toronto.
James Robertson Co., Ltd., Toronto.

Vacuum Systems of Heating.
C. A. Dunham & Co., Ltd., Toronto.

Water Supply Systems.
National Equipment Co., Ltd., Wabash Avenue, Toronto.
The General Machinery Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.

ONE MAN Using One Hand Can Cut Off a 4-Inch Pipe in 4 Minutes With This New 2½-Inch to 4-Inch Pipe Cutter

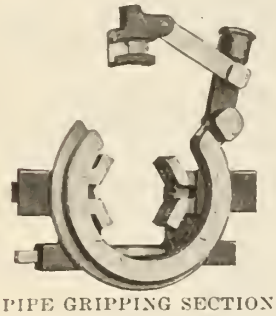
THE CUT IS PARTICULARLY CLEAN, there being a CONSPICUOUS ABSENCE OF BURRS, inside and outside. **Pipe never becomes split or distorted,** while the cutter can be quickly adjusted to fit to any size from 2½ in. to 4 in.



2½-4 IN. SQUARE END PIPE CUTTER.

As cutting is done by means of a ratchet, pipes may be cut in cramped places which would otherwise prohibit the use of an ordinary tool.

Will cut pipe off square, whether bent or not, the same as cut on lathe.

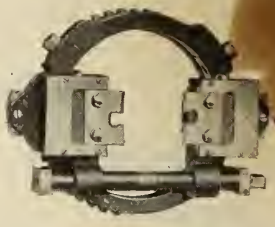


PIPE GRIPPING SECTION

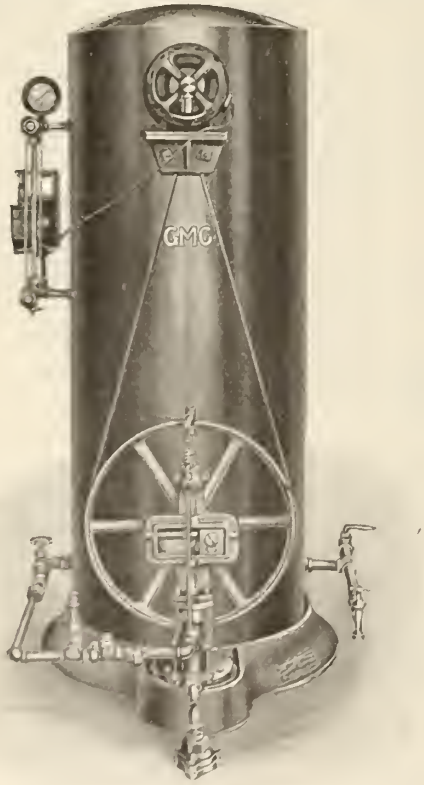
If you are anxious to make pipe cutting easier and quicker, and save much labor, **write us for full particulars.**

The Borden-Canadian Co.

TORONTO, ONTARIO



CUTTING SECTION



G.M.C. Water Systems

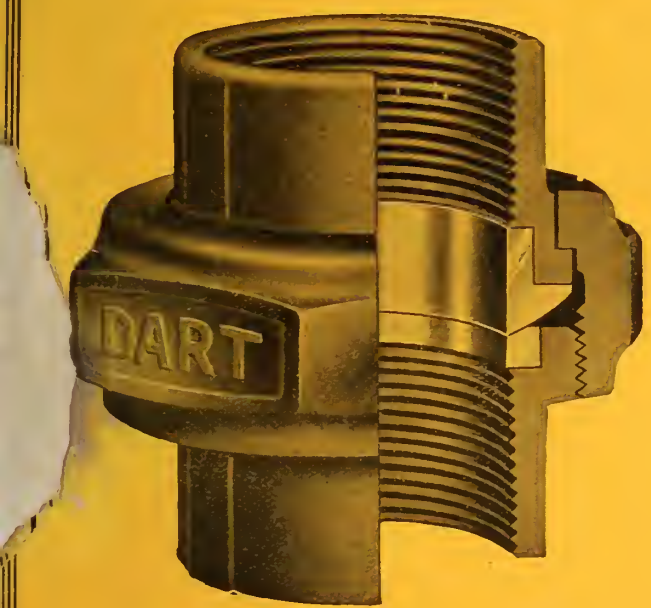
We are now furnishing our "G.M.C. Special" Automatic Electric System, as in cut, with our new Ball-Bearing Pump — Capacity 200 gal. per hour. It is operated by a one-quarter horse-power motor. The Pump itself will supply a sprinkler without the aid of the tank.

This System fulfills conditions which other manufacturers meet with a one-half or one horse-power pump. We save you first cost and cost of power for operation.

THE GENERAL MACHINERY CO., LTD., 22 Mulock St., TORONTO

"Dart" Efficiency

means permanently satisfied customers



Dart Unions Cannot Deteriorate at the Joint

because the TWO BRONZE FACES never rust or corrode.

These faces, being ball-shaped, are easily and quickly drawn together, whether pipes are in or out of line.

Expansion, contraction or vibration have no effect upon these Unions, because the Dart's iron parts are built extremely heavy for any service, no matter how severe.

Our trade-mark, which is cast on every dart, is your **guarantee.** Any of these pipe couplings that are not right will be immediately replaced, two for one.

Order from your jobber.

Manufactured by Dart Union Co., Ltd.
Toronto, Canada

KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

This plant is at your service.
Help us keep it busy.

REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

Quickest possible deliveries. **Consistent Prices.** Best quality of goods. **Write for Catalog No. 5.**

The Kerr Engine Company, Limited Walkerville, Ontario

Valves and Hydrants Exclusively

MR. PLUMBER:

Re ''Made in Canada'' movement.

You are a Sanitary Engineer operating a plumbing business in a locality with competing shops.

Suppose these shops are in disfavor with the Public, through installing inferior ware.

You would consider yourself in a very advantageous position, would you not?

You are in just that position.

Public sentiment demands ''Made in Canada'' goods of Quali

The ''PERFECTO'' line, made by the GALT BRASS COMPANY, LTD., satisfies that demand to the letter.

But! Do you know that the ''PERFECTO'' line will establish satisfied customers for you?

If not, send us an opening order now. Will you do it?

Each article is guaranteed as follows:

> ''Any article of our make proving defective through inferior metal or improper workmanship on our part, will be replaced with TWO good ones, at NO CHARGE to you.''

(Does that look reasonable?)

THE GALT BRASS COMPANY, LIMITED

GALT - CANADA

TRADE-MARK
PERFECTO
REGISTERED

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX. Publication Office : TORONTO, JANUARY 15, 1915 No. 2

"Standard Ideal SANIMAT"
PATENTED, MAY 3RD, 1910.

You can buy many other kinds of Mats, but you can't buy a better one at any price, or as good a one at a better price.

The "SANIMAT" is constructed of hardwood slats held firmly together by means of tough, unbreakable fibre binding and hardwood ball joints. It is durable—FLEXIBLE—can be rolled up or used in any position without danger of breaking.

Can be made in any size or shape to suit any mat purpose. No better Mat is made for Sinks or Drain-boards, and it is equally as valuable for use as Floor Mat, Automobile or Carriage Foot-rest, etc. It is more durable—easier to clean and keep clean—more sanitary and usually less expensive than Rubber Mats.

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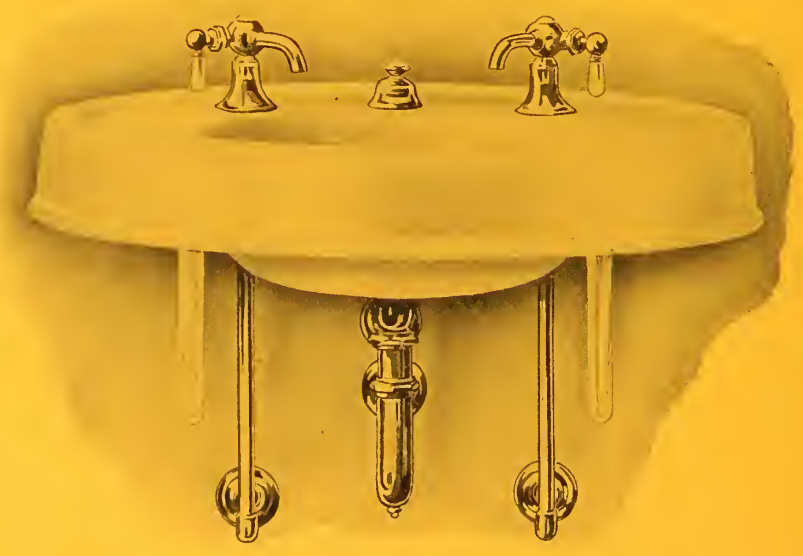

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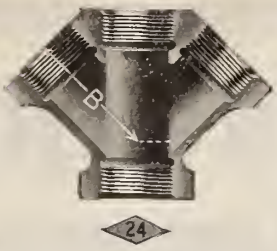

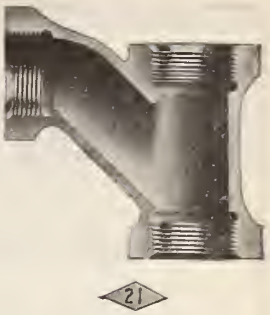

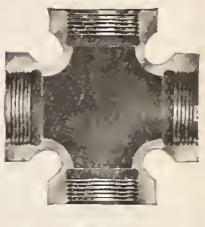

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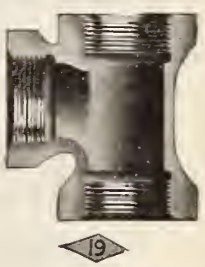

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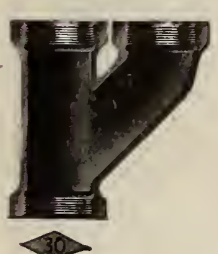

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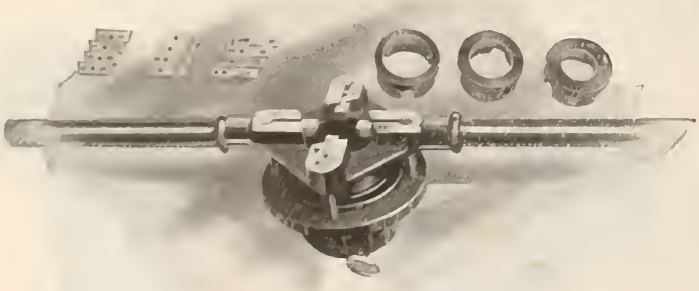

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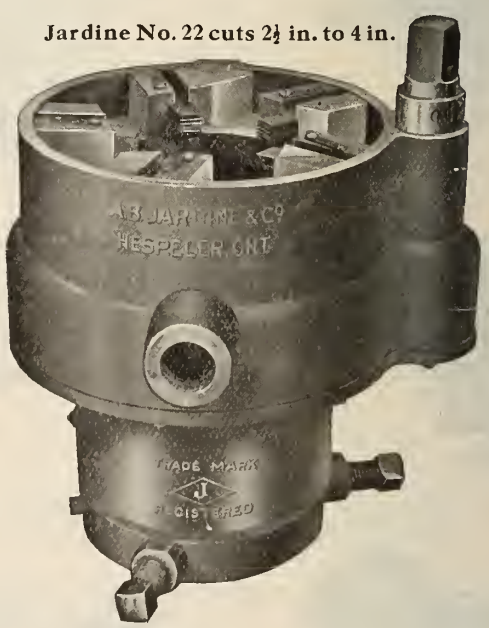

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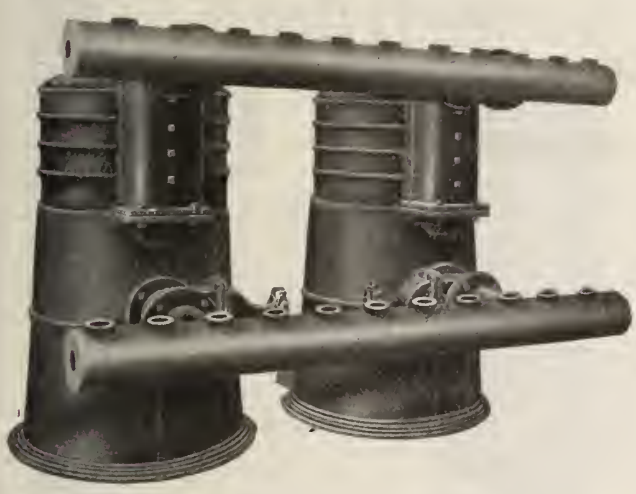

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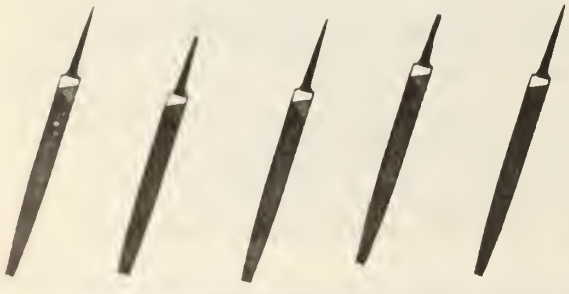

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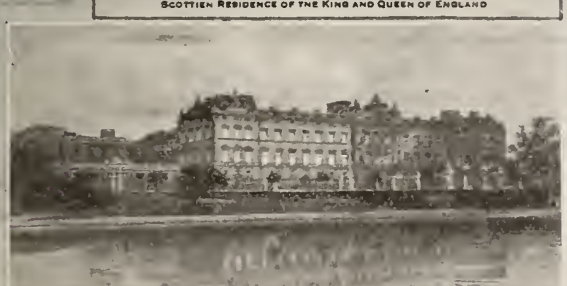

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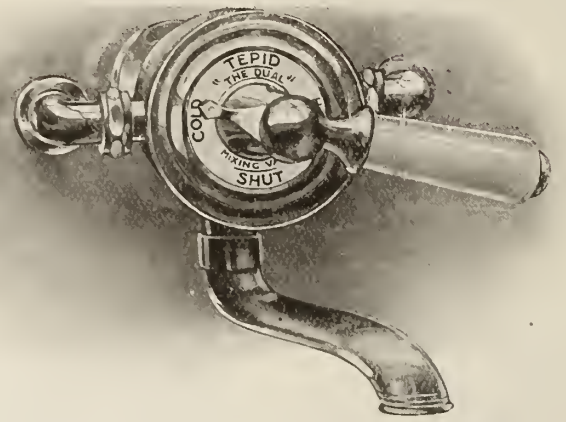

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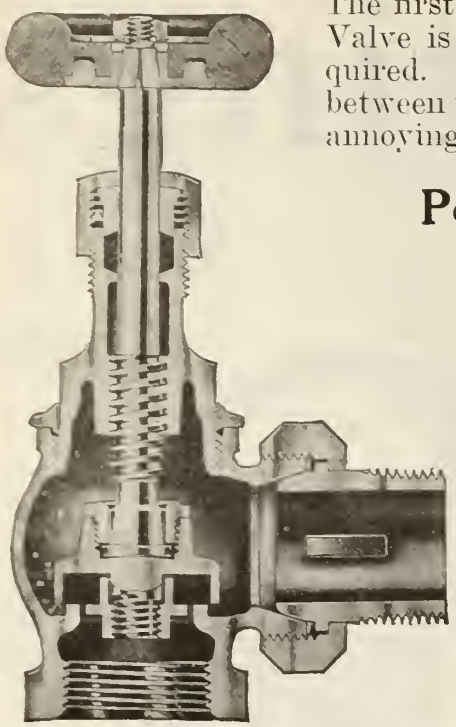

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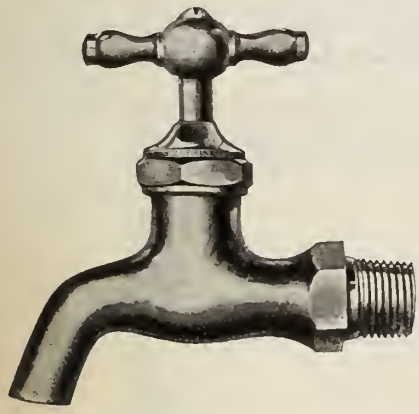

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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, JANUARY 15, 1915 No. 2

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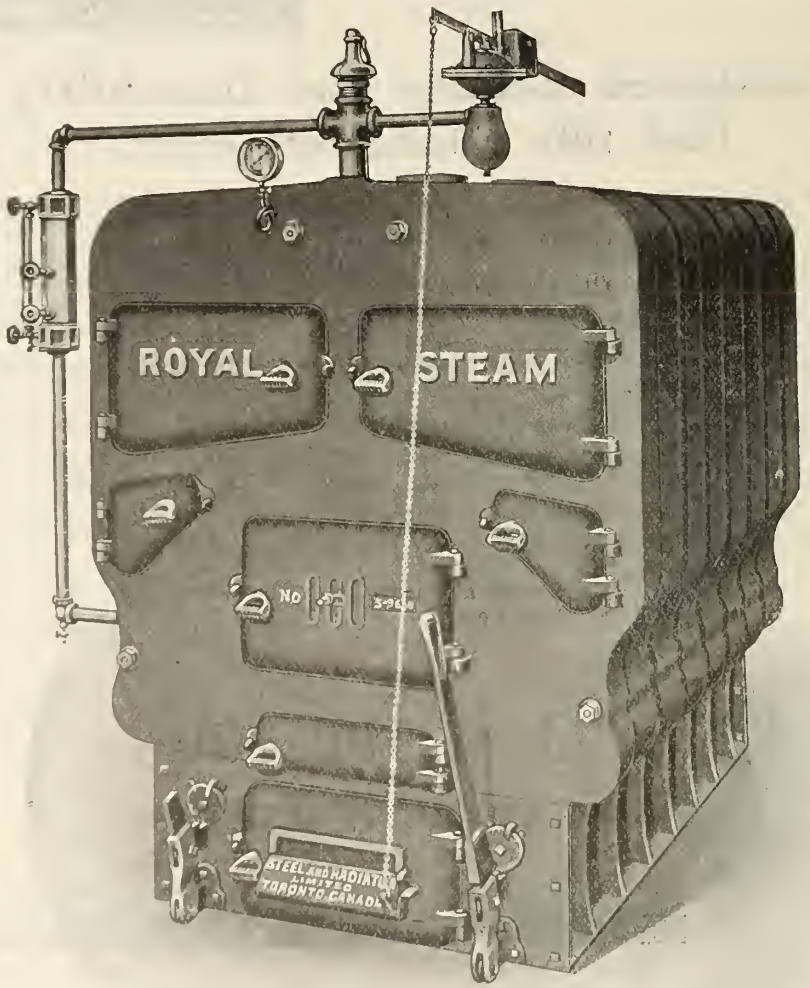

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THE SANITARY ENGINEER

VOL. IX. JANUARY 15, 1915. No. 2

Big and Little Men

The Value of an Employee to His Employer May be Estimated by the Amount of Interest He Takes in His Calling, and the Ability He Has of Increasing His Own Earning Power in the Easiest Way.

BY E. ST. ELMO LEWIS.

READERS of this page will no douht be interested in portions of an address delivered hy E. St. Elmo Lewis before the employees of the Art Metal Construction Co., Jamestown, N.Y. Mr. Lewis has recently heen appointed vice-president and general manager of the company, and the address was delivered at a reunion of the factory family. The address in part was as follows:—

"I have worked for $7.50 a week in my life, and when I was working for that amount of money, I was naturally thrown among a class of people who worked for that amount of money. There was just one man out of the group that I knew then, whom I determined to copy, whom I determined to emulate, and I was fortunate, indeed, in the friendship that came through that contact, because that man taught me one thing that I shall never forget—that was that booze and brains did not mix. For 20 years I have watched it, and I have never seen it mix. The man who has brains does not hooze, and the man who boozes cannot have brains, and that is the sum and substance of what I have found out in 20 years of active husiness life.

"The next thing I found out was that a man's payment came almost in direct proportion to the amount of thought and knowledge and learning and skill that he had.

"A man asked me the other day if a man can make a good suggestion, why it was not possible to make him a manager. I will answer that very simply. There is no reason why he should not be made manager, if he thinks manager thoughts. There is no reason why a workingman should not be a foreman, if he thinks foreman thoughts, hut if he continues to think $2-a-day thoughts, he cannot get a $4-a-day job. That is the world's final answer to all the questions of reward. As a man thinks, so he is. This brings me just for a moment to something that I have thought ahout a great deal in 20 years. How is a man paid for what he does? He is paid in money, which is the reward in hand that society gives him for the work that he does. He is paid in usefulness, because all of us like to feel that we are of some use to the day and the hour in which we live, to the firm which employs us, to the family that we support, that we are some use to those we love, that we can render some tribute and some satisfaction to them. As we progress and become better in our work, we are paid in the consciousness of excellence of the thing we do. There is no man or woman in this audience who does not find a satisfaction in having done a work hetter than it has been done before, hecause we are conscious that we have acquired a growing capacity to do the best work in the best way. We are paid in power, which is conscious strength, and power comes of knowledge of the best way in which to do a thing, and a mastery of how to do it. We are paid in independence, a knowledge that we ourselves can stand upon our own feet and are masters of our own destiny. We are paid in honor, and honor is what the world gives us for the excellence of the thing that we contribute to the sum of its production in happiness, in wealth, in skill. And lastly, we are paid in happiness, which comes of a quiet conscience, a satisfied heart, a tranquil mind, and the consciousness of having done that which has made our craft better, our day broader, and placed our world of to-day a step beyond the world yesterday.

"After 30 years of watching men come and go in husiness, in factories, in sales organizations, in office organizations, I am convinced that 90 per cent. of the failures fail hecause they do not work intelligently enough. A Japanese proverh puts the whole idea in a single epigram. No man will find the best way to do a thing unless he loves to do that thing.

"I like enthusiastic men, hecause it is the man who is enthusiastic, whose heart, mind, and soul is in his work, who will display that irresistible initiative that is the great quality of all great leaders, such as Napoleon, who while others fiddled over details, he thought and acted, for action, my friends, action, is the distinguishing characteristic of greatness. It was the same of Von Moltke, that man who fought the Franco-Prussian war in 1870-71. It was the same with Nogi, the great Japanese commander. So you see, my friends, these are the thoughts that occur to me to-night as I think of these men, fellow-workers of yours and mine, who have done the exceptional thing, and who stand out from the rest.

"A hig business, my friends, a really hig business, grows big men, grows big department heads, grows big managers, grows big superintendents. Carnegie, no matter what may be our opinion of him for his principles, did one thing that demonstrated that he was a big man. He made forty millionaires. He gave everybody a chance.

"Now, you can always tell a hig man by the fact that he believes fact first, and then he believes in men. You can't be a big man unless your surround yourself with hig men. Some men are like a pin cushion, the only thing they will hold is pinheads, and a pin cushion never did anything. It is a convenience, and that is all. Some managers are exactly like that. They only believe in the man who shows a personal loyalty to them. That man is a crooked thinker. I can always tell a manager or a foreman by the number of men he hires and fires. The hiring of men is the most important thing in a factory. It costs a factory from $3.15 to $19.65 to hire a single man, and it costs from $95.16 to $500,000 to fire one.

"Now, the foreman who is a bad

picker, is a bad foreman. I don't care what other attributes he has, he is a liability. We all make mistakes. I made one the other day. I promoted a man before he was ready for it. He developed a swelled head inside of 48 hours, and then I had to fire him. That was one mark against me. I didn't blame the man. I blame myself. It was my fault.

"You foremen, you managers of departments, you have to be leaders; you have to have authority, and I tell you now that the authority in any business, anywhere, flows to the man who knows. It isn't in a title on the door; that all helps, all have their place, but authority lies inside of a man's head and his heart, because leadership goes to the man who can lead, and it goes to the man who knows how to lead. So, foremen must be helpers of men, not mere prodders.

"A foreman must have leadership, knowing how his men can do things, show them, help them, and sympathize with them, make them successful and encourage them to do that which will bring them a reward. I know some men who are mere prodders. They are hustlers—do-it-now men. I watch those men, I watch their record, I watch the men who come and go in their departments, and just as soon as I see men coming and men going all the time, a steady stream of going and coming out, of hiring and firing. I know that man is not a manager, he is not fitted for it, I don't care how skillful he may be; I don't care how long he has been in the business; I don't care what he knows, he is a liability, and he should not be permitted to spoil the department.

"I have found, in a somewhat busy life, and a somewhat varied one, that the men who are not up on a thing, are generally down on it. I have found men who have never been disturbed in the easy flow of their time and hour, who have made a nice little groove in which they lie down, as though they were in a feather bed. These are the men who are the hardest to handle, the hardest to get to do the new thing in the new way that the day requires. Just think, for a minute, that the outside viewpoint is sometimes the most vital. We get so interested in the work immediately in front of us, we get so interested in the work that is in our office, or our department, we get so used to doing a thing in a certain way, that we resent the fellow who comes along and jars our attention away from that work there and asks us to do it in a different way. We decry against it, and try to fool ourselves. We don't enter into the proposition and make an examination to find out whether it is right or not. We don't find out whether it is true or not, but we make use of some cant phrase, as though we were examining it, and we say, 'It was never done before,' or 'This business is different, or 'What does he know about the metal furniture business?'

"Why, my friends, all great changes come from the outside. Did you ever think about that? It is true. Pasteur, who discovered the antitoxin for a mad dog's bite, for instance, was not a doctor at all. Most of you thought he was. Bell, the inventor of the telephone, was not an electrician. Morse, the man who invented the telegraph, was a portrait painter. Ingersoll, the man who made a watch for a dollar, thereby making the dollar watch famous, was a farmer. He wasn't a jeweler, nor a watchmaker. Columbus, who discovered America, wasn't a sailor. He was a comber of wool. Cromwell, who gave to England its second Magna Charta, was not of the royal blood, yet he sat upon the throne. The Cambria Steel Company was in the last depths of despair and near to bankruptcy when a mere dry goods merchant took the presidency and made it a great financial success. Napoleon, the conqueror of Europe, was a mere Corsican adventurer, and Garibaldi, who remade Italy, was a plebeian, red-shirted working man."

TWO WAYS OF DOING BUSINESS.

The manufacturer who comes out in a trade or technical paper advertisement and asks its readers to use his product is inviting trade in the straightforward way.

The dealer who tries to keep you from buying that article by offering something "just as good" is seeking an underhand advantage.

Reputable dealers do not do this.

It is a method of business that does not pay.

People are being educated to have faith in advertised products—because the manufacturer of advertised goods usually keeps faith with them.

They "get what they ask for."

CONFIDENCE, CAUTION, PRODUCTION.

Confidence, caution and production are the Canadian business men's essential equipment to face the year 1915. The future is truly uncertain, but whatever comes, no Canadian can afford to forget these three watchwords.

If Canadians lose confidence in their own ability to pilot their well-equipped ship, it cannot be expected that outsiders will continue to exhibit faith in "the land of opportunity." Occasions will arise during the year when confidence in ourselves and our country will win the confidence of British and foreign interests.

But we want a new kind of confidence—not the hilarious and over-optimistic variety which has been in vogue during late years, and which has created weaknesses in our financial position, that now make it additionally hard for us to carry our share of the Empire's burden in days of strife. Rather as a nation we need a cautious confidence—one that will keep us working steadily forward, content even with keeping our heads above water, but never admitting defeat or retreat. The readjustment which started in 1914 will continue in 1915, and the various businesses in the Dominion will go through a sifting process. On account of inherent weaknesses some may fall by the wayside, but this should cause no alarm. It will mean in many cases the triumph of tenacious business ability over the gambling and exploiting element that has played too large a part in Canadian affairs, and which thrives best in prosperous periods and suffers inevitable elimination in periods of reaction or readjustment.

The enormous demands of the belligerent countries for foodstuffs and war materials may be a temptation to Canadian business men to make special effort to profit as much as possible by the demand. But they should remember that it is only a temporary demand, and one that does not warrant a great outlay of capital to meet it. It will be of great advantage to the country to adapt its present manufacturing plants to the best advantage in turning out war materials; but extensions and capital outlay may prove costly. In fact, capital outlay for all purposes will perforce be limited. Municipalities, especially, must be cautioned against further outlay. Taxation burdens on the present populations of our cities are sufficiently heavy. War taxes—direct or indirect—will be added to the usual taxation. Hence the necessity for caution of municipal officers.

The gospel of production has been preached in Canada this year, until it has become trite. A speaker, who recently delivered an address on the war, started in this way: "No doubt many of you are getting tired of hearing about the war and wondering why I should be foolish enough to still be speaking about it. I will tell you why. It is simply because we must not allow ourselves for one minute to forget the serious task we have commenced. We must not grow tired of hearing about it. We must not take our hand from the plow." For the same reason, Canadians must not forget to produce. Just as the Empire has as its task the overthrowal of domineering Prussianism, so Canada has as its task the meeting of its loan and other obligations by production and the development of its natural resources.

Why Many Fail in Business

What Starting in the Sanitary and Heating Business Should Mean—Certain Responsibilities Are Entailed in the Undertaking — Salary is an Overhead Expense if Owner is Actively Engaged in the Business.

AT this season of the year when the majority of sanitary and heating engineers, are not overloaded with business, and when time, to some extent is liable to hang on one's hands. It would be as well to take a little closer look into methods adopted of doing business. Collections, overhead expenses and general shop management.

After weighing the matter up carefully as to why many fail in business, we are of the opinion that the main reason, is that of having a wrong viewpoint of the responsibilities involved.

For instance, as sure as there is a lull in business and a certain percentage of journeymen are laid off, a number of those out of employment "hang out their shingle," and start up for themselves. The possession of the shingle seems to be the only qualifications they think is necessary, plus a fairly good kit of tools, and many Canadian city authorities apparently take the same view from the very fact that any person who applies for it can obtain a license. "Legal authority" to engage in this calling, by simply paying any sum from one dollar up.

In nine cases out of ten we find that the most skilled mechanic is the last man to become involved in this way simply because he reasons the matter out and uses a little more judgment, just as he does when executing a piece of work in his every day life.

Before starting in business a person should in all justice to himself and to those who may become involved or interested in his enterprise, take into consideration certain things which he will of necessity be called upon or be expected to do.

He must find out what it is going to cost him to do business. His own personal salary, rent, light, heat, insurance, telephone, stationary, postage, freight and express charges. Bank rate interest, wear and tear of tools, etc., and every other little item which he may be called upon to provide for, these items will at a glance show him whether he is prepared to involve himself to that extent or not. Let us reason the matter out in this way and presume that the person intending to "hang out his shingle" is a good mechanic, and when in employment can demand say 40 cents an hour for a 9-hour day.

Salary per week (50 hours) $20. Total per year	$1,040.00
Shop rent $10 per month	120.00
Light average $1 per month	10.00
Heat	25.00
Insurance	10.00
Stationary	20.00
Telephone	40.00
Postage	10.00
Freight and cartage, say	100.00
Sundries	25.00
Bank charges, interest	100.00
Total	$1,500.00

(Continued on page 25.)

Why Many Fail in Business

Because They Figure Their Profits Incorrectly

THE RIGHT WAY

EXAMPLE:

Expense of doing business is 25%
(Figured on Gross Sales, *i.e.*, selling price.)
It is desired to make a profit of 10%
(*Must* be figured on selling price.)
Cost of an article is $2.00

Find the SELLING Price

SOLUTION:

Selling price = Expense (Rent, Light, Heat, Wages, Advertising, Insurance, Freight, Express; Delivery Charges, Telephone, Int. on Capital Invested, Depreciation of Stock, Bad Debts, Extraordinary Expense) + Profit + Cost

100% . . . equals . . Selling Price
35% . . . equals . . Expense 25% + Profit 10%

65% (of selling price) equals . . . . . Cost

$2.00 will be 65% of selling price

Divide $2.00 by .65 equals $3.08

ANSWER:

Selling Price should be made $3.08

PROOF:

Expense	25% of	$3.08 equals . .	$ .77
Profit	10% of	3.08 equals . .	.31
Cost	65% of	3.08 equals . .	2.00
Selling Price	100%	equals . .	$3.08

THE WRONG WAY

Figuring it as 25% plus 10%, or $2.70
which is *less* than Cost $2.00
plus Expense . . . . .77 = $2.77

THAT'S WHY THEY FAIL

Analysis of Canadian Sanitary By-laws

Commenting Upon the By-law Known as By-law No. 528, Governing Sanitary Engineers and Sanitary Engineering Construction in the Town of Waterloo, Ont.

(Continued from last issue.)

THE next five clauses in this by-law deal with water closets. The first, Clause 39. is of so general a nature that it need not be commented upon.

Water Closets.

Clause 39.—Pan or hopper closets are prohibited within dwellings.

Clause 40 is of more importance and reads as follows:

Clause 40—Water closets shall not be permitted in cellars or basements, without special means of lighting and ventilating, approved by the inspector.

This clause is all to be desired as far as it goes, but is scarcely complete, for instance, a clause of this nature would be better if illustrated by a few specimen plans or drawings. It may of course be made to work alright providing there is a sufficiently reliable and practical inspector in charge of the work, but if not, the clause could be made to mean anything.

Clause 41.—All water closets must be supplied with a sufficient quantity of water to keep them at all times clean and well flushed, supplied from a tank from which water is not drawn for any other purpose. Direct service of a water closet is not permitted.

Clause 41 is not too bad but would be more complete if a given quantity of water were specified, say for instance three gallons as a minimum for each flushing.

It is not always a case of simply flushing the water closet bowl which has to be taken into consideration, but the question of carrying the excreta to a point outside the building at least. There have been cases where owing to the w.c. tank valve not being properly adjusted, the quantity of water has not been sufficient to carry the excreta and paper far enough away, and it has accumulated to such an extent as to cause the horizontal line of pipe to become partially blocked. Therefore we would always recommend that some quantity not less than three gallons be allowed for each flushing of a water closet.

Clause 42.—Where a water closet is ventilated the vent pipe shall be not less than two inches in diameter.

Clause 42 evidently refers to the local venting of the water closet because in Clause 34 it distinctly states that "Every trap except water closets," etc., must be vented, and if Clause 42 does refer to local vents, no doubt 2-inch vent pipes would be large enough. We would, however, far rather see 3-inch pipe used. The local vent certainly needs to be properly installed if anything like efficient service is expected of it.

Clause 43.—Rooms in which water closets are placed shall be ventilated into the cock-loft, or into the external air in a manner approved of by the inspector.

Clause 43 is not quite as clear as it might be and is also left to the discretion of the inspector. It would be far better for all concerned if it were more specific; something like this for instance:—

"Rooms in which water closets are located shall be provided with windows containing not less than four square feet of glass which shall furnish a good supply of light and be placed in such a position as to admit the external air."

It might also be enacted in such a clause as 43, that no w.c. aparatments should be used as a sleeping room. This practice is by no means uncommon in large towns and cities.

BATH TUBS, SINKS, WASH BASINS.

Clause 44.—All wash trays, sinks, etc., must be of non-absorbent material.

This clause is O.K., and needs no commenting upon.

Clause 45.—The waste pipe from any fixture shall not be connected with the trap of a water closet or of any other fixture.

This clause is not a bad one, but it might be made a little clearer. For instance, it would be impossible to connect any waste pipe to the trap of a w.c. because the trap and w.c. bowl are one, and there is no possible way of making any connection unless the bowl be of the Richelieu style, and then the vent horn would have to be used, which of course would not be allowed under this clause. We rather think what is meant by this clause is "That no waste of pipe shall be connected to the lead bend of the water closet." There are a few towns still permitting the waste pipes from other fixtures to be wiped into the lead bend but one by one they are discontinuing the practice.

Clause 46.—Exit pipes to all fixtures except water closets shall be furnished with suitable permanently attached strainers.

This clause is general and really means that fixed strainers must be attached to every fixture except water closets. This clause may be improved by adding that all urinals shall be furnished with a screen strainer, not attached to the fixture, which can be removed and cleaned.

There is one trouble with urinal stalls and fixtures which has a peculiarity of its own. Persons using them will persist in throwing cigar and cigarette stubs, matches and the like into the pans and this causes them to be blocked up, involving constant annoyance and expense to the proprietors, as well as a detriment to the public comfort.

Clause 47.—The vent pipes to traps of all fixtures but water closets shall not be less than one and one-quarter inches in diameter, and when more than fifteen feet in length, they shall not be less than one and a half inches in diameter.

This clause needs little comment except that it is better than some in that it requires all vent pipes over 15 feet in length to be increased from 1¼ inch to 1½ inches which is very desirable.

Concluded in next issue.

A CORRECTION.

On page 20 of our last issue, in commenting upon clauses 33 and 34 some remarks intended for another subject were inadvertently inserted. We will therefore set the matter right by taking these clauses up again.

Clause 33.—Every water closet, urinal, basin, sink, wash tray, bath tub, and every tub or set of tubs, must be separately and effectually trapped as near the fixture as possible, and never more than two feet therefrom.

This clause may work admirably, and be quite in order in the case of a residence where it is very seldom more than one fixture of a kind is installed, such, for instance, as lavatories.

But we do not think it is necessary to separately trap a battery of lavatories

(Continued on page 23.)

Domestic Hot Water Supply Problems

A Series of Articles Dealing With the Problem of Hot Water Supplies, Range Boiler Connections, in Several Forms and Methods Adapted as a Means of Heating Water Under Various Conditions.

IN this article we are showing the general principles involved where there are two heaters connected to one range boiler, one heater being on a lower floor and one on the same floor as that on which the boiler is situated. The three installations shown in Figs. 1, 2 and 3 are simple in a sense. It will be seen in Fig. 1 that both the heaters are, as it were, connected, yet in such a way that either one or both heaters may be used. The two top connections are inserted into the side of the boiler and the lower into the bottom. All stock range boilers of 30, 40 and 50 gallons are tapped 1-inch, and to get the best results with this method the following fittings should be used. Start out at the side with a 1-inch nipple, 1-inch elbow, another 1-inch nipple and next a 1 x ¾ x ¾-inch tee. At the bottom start out with a 1-inch nipple, next a 1 x ¾ x 1-inch tee, leaving the ¾-inch outlet for the hibb-cock; next another 1-inch nipple and a 1 x ¾ x ¾-inch tee, using ¾-inch pipe and nipples to complete the rest of the connections. This method will give a volume of warm water and maintain it better than any other connection known. When water is wanted more quickly, though not in great volume, it is always as well to make a slight difference. This can be best done by adopting the method shown in Fig. 2. This gives the duty of quick heating to the heater which is on the same level as the boiler. It will be seen that the top connection is inserted into a tee at the top of the boiler; this tee should never be less than 1 x ¾ x ¾, the 1-inch one being connected into the

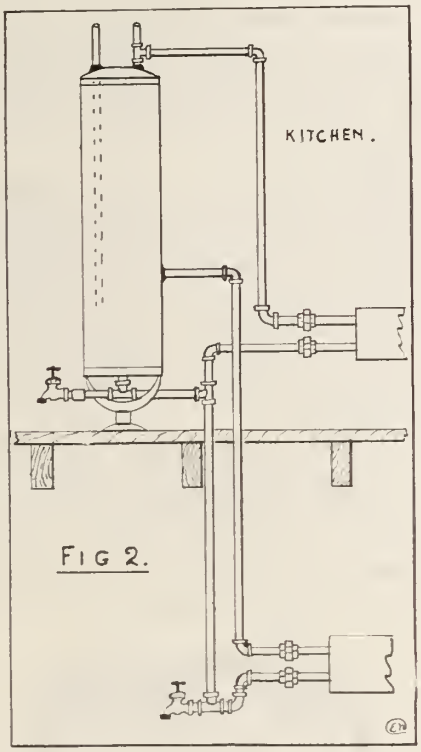

FIG 2.

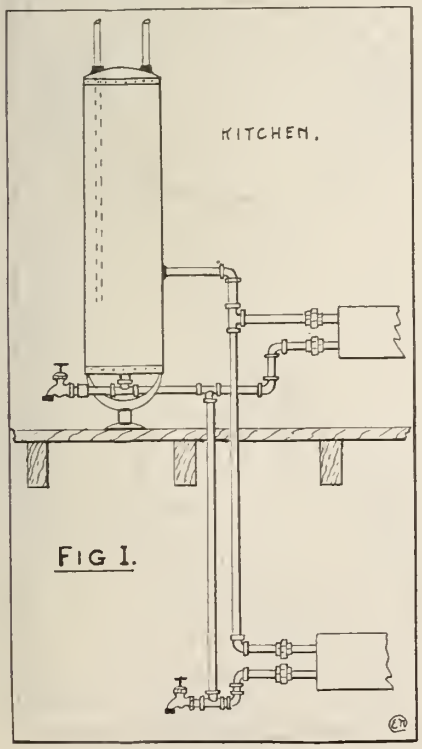

FIG 1.

boiler by the use of a 1-inch close nipple, or a union tee coupling. The reason why we suggest that the top pipe of the lower heater be placed into the side of boiler is because the lower heater is generally one installed in a furnace, or else a small laundry heater. That is, of course, speaking of an installation in a private residence.

Fig. 3 shows three heaters, one a gas water heater. This latter, it will be seen, is connected at the top of the boiler, and will give hot water in a very few minutes. These gas heaters are becoming more popular every day and no house is considered complete unless there is a gas water heater installed and fitted up. Another feature which should never be lost sight of is, that when a sanitary engineer installs a range boiler, he should never forget to leave it as complete as possible, and let the owner know he intends doing so. We refer to the insertion of a tee connection on the top of a range boiler, and if any range connections are to be fitted up, always leave tees off at convenient points, which can be used for making additional connections. These little things only cost a few cents more, but have often been the means of bringing more business to the sanitary engineer who in the first installation showed a little forethought. It will be noted that a hose bibb is shown both in the kitchen and basement. These are often omitted at the kitchen connection, but should not be. If the owner or tenant were instructed to use these taps oftener when using water for floor washing, it would be the means of preventing the accummulation of dirt in the bottom of the boiler as well as in the pipes. There have been scores of cases proved where the making of a connection at the heater in the basement as shown has been the means of prolonging the life of the heater, as well as of giving better results. Such a connection also puts a greater head of water on the bottom pipe by several inches, thus creating a more rapid circulation of water through the top pipe.

(Continued in Next Issue.)

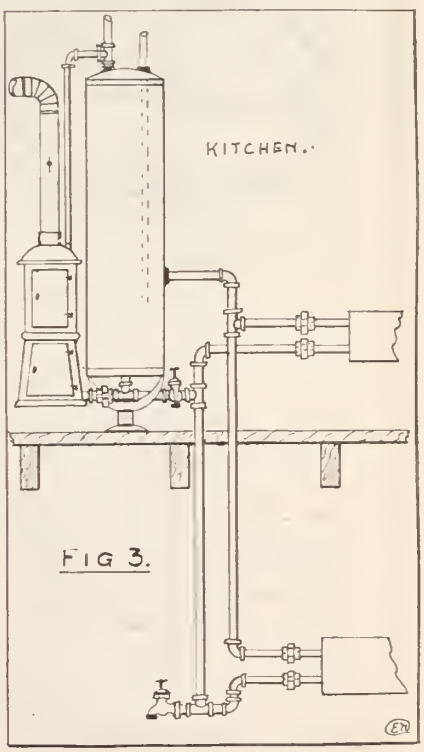

FIG 3.

Practical Course for Sheet Metal Workers

Article No. 9 of Series

By CHARLES SEIVERS

Article 9.

IN Figs. 1 and 2 are shown two different methods of drawing an ellipse, and in Fig. 3 is shown a practical and quicker method. In Fig. 4 is shown a figure which cannot be called an ellipse but rather an elliptical curve, as it is not a true ellipse, as its different curves are portions of circumferences of a circle, and no part of the curve of an ellipse can be considered to be a portion of the circumference of a circle.

In Fig. 1.

To draw an ellipse when the transverse axis, as at A-C and the conjugate axis, as at B-D are given.

Draw A-C and B-D at right angles, bisecting each other at E. With B and D as centres and A-E or E-C as a radius, draw arcs to cut A-C as at F-1 and F-2. These points are the foci of the ellipse. Between one of the foci and E, mark off on A-C any number of spaces, having their decrease as they approach the foci as shown at 1-2-3-4-5-6-7. Using the foci, F1 and F2 as centres and A-1 as a radius draw arcs shown at 1-1-1-1 with the same centres, and, using 1-C as a radius draw arcs, cutting those drawn with radius A-1. With A-2 and 2-C, A-3 and 3-C, etc., as radii, draw arcs from the same centres F1 and F2, to intersect at points on curve as at 2, 2, 2, 2, 3, 3, 3, 3, etc. And through these points draw a curve which will be an ellipse.

In Fig. 2.

Another method of drawing an ellipse is here shown. Having drawn the axes as A-B and C-D at right angles to each other, draw two circles with E as a centre, and E-C or E-D and E-A or E-B as radii.

Divide these circles into any number of equal parts as shown by the divisions 1, 2, 3, 4, 5, 6, etc. From the points on the large or outer circle, draw lines parallel to C-D and cut them by lines drawn parallel to A-B from corresponding division on inner circle. A curve drawn through the points of intersection will be an ellipse.

The curve of an ellipse is such that the sum of the distance of any point in it to each of the foci, is equal to the length of the transverse axis. This point can be noted in Fig. 1, the first arcs are drawn with a radius of A-1 intersected by arcs drawn with a radius equal to 1-C., thus, from any point 1 in the ellipse to each of the foci is equal to A-C.

From this peculiarity is based the method shown in Fig. 3. In this figure A-B and C-D are the axes of the ellipse. With C and D as centres, and A-E as a radius draw arcs cutting A-B at F and F. These points are the foci of the ellipse.

Place a pin or thumb tack in each of the foci and in one of the points C or D. Around the three pins tie a piece of string, tightly drawn, remove the pin at the end of the axis as C or D and place a pencil in its place. Keeping string drawn taut move the pencil around the two pins remaining. This will draw or trace an ellipse.

Fig. 4.

With the transverse axis given, as at A-B, draw an elliptical curve.

Divide the axis A-B into four equal parts, as shown at E-D-C, with E and C

(Continued on page 25.)

PLATE 9

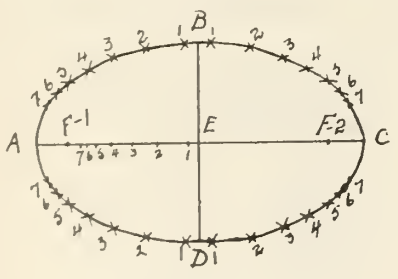

FIG. 1

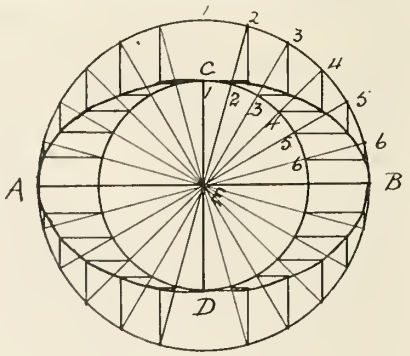

FIG. 2

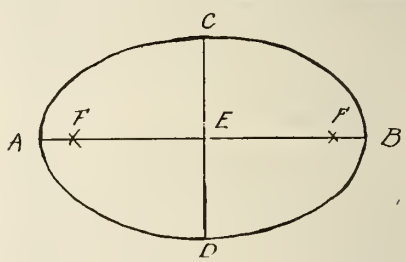

FIG. 3.

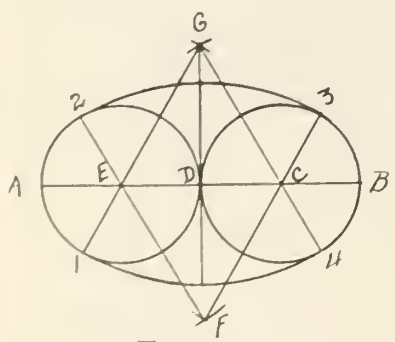

FIG. 4.

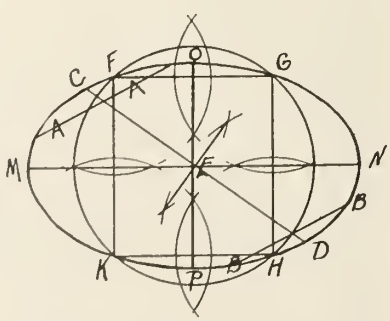

FIG. 5.

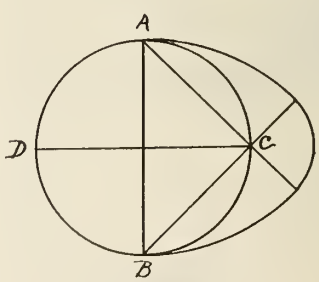

FIG. 6

The Principle of Elbow Pattern Developing

A Complete Course, Treating in a Simple Way, the Art of Elbow Pattern Developing. Specially Written for Those Who Have Only Received a Limited Geometrical Education.

By EDWIN NEWSOME

ARTICLE No. 4.

IN THIS article we are showing how to develop a pattern plate, from which 5 different elbows may be made namely:—2 piece, 90 degrees, 2 piece 70 degrees, 3 piece 90 degrees, 4 piece 90 degrees and 6 piece 90 degrees.

The two-piece 90 degree elbow being actually cut out, whereas the others are punched. The best way to develop this plate, is to take a piece of white cardboard and use a lead pencil, next make a plan as shown, of whatever size of elbow required. Then divide off the circle as shown at 1, 2, 3, 4, 5, 6, 7, 8, 9 and draw dotted lines downward from these points. Next rule off the base line which must be as far away from the plan as necessary. Then develop the two-piece 90 degree pattern first by following out the rules laid down in previous articles and described on plate I, Fig .3, and plate 3, Fig. 1. After this pattern has been developed, erase the mitre line and divide off the arc in two from base line to 70 degrees, giving a mitre of 35 degrees. This is then marked off at each point where the dotted lines cross the mitre, and each point is carried along to its respective dotted line described by the stretchout measurements. The first to be marked off being the highest point on the mitre to 9, the next to 8, 8, the next to 7, 7, and so on until all points have been used. Then erase the mitre line, as was done before, and repeat these operations, until all the patterns have been developed. Next, lay the cardboard over a sheet of galvanized iron, or any other sheet iron which is to be used and cut out the 2 piece 90 degree pattern, beginning at A, or if it is desired to leave the sheet square, then simply punch each point, as shown in the case of the lower patterns B, C, D, E, all of which will only require one plate. It must not be overlooked, that no allowance has been made for seams, therefore whatever size of seam is required must be added on to the pattern. The reader will note every pattern shown in these articles is the same radius, and it may be necessary to increase the radius of an elbow. This is done by simply increasing the length from the curves of the pattern to the base line. For instance suppose the pattern of a 6-inch 6-piece elbow is made for an elbow of 18 inch radius, and it is desired to make an elbow 24 inch radius, simply open up the compasses to 24 inches, and draw an elevation of an elbow of that radius, then add length, say from E to base line, which will in that way give the desired result. By making a plate as shown in this article, it will only be necessary to have one plate for each of every size of elbow namely:—one plate for 4-inch, one plate for 5-inch, and so on; whereas by having a separate pattern for each size as well as number of piece elbows, it would require 5 patterns for every size, to say nothing of the trouble of having to hunt through a whole host of patterns before the right one can be found.

(Continued in Next Issue.)

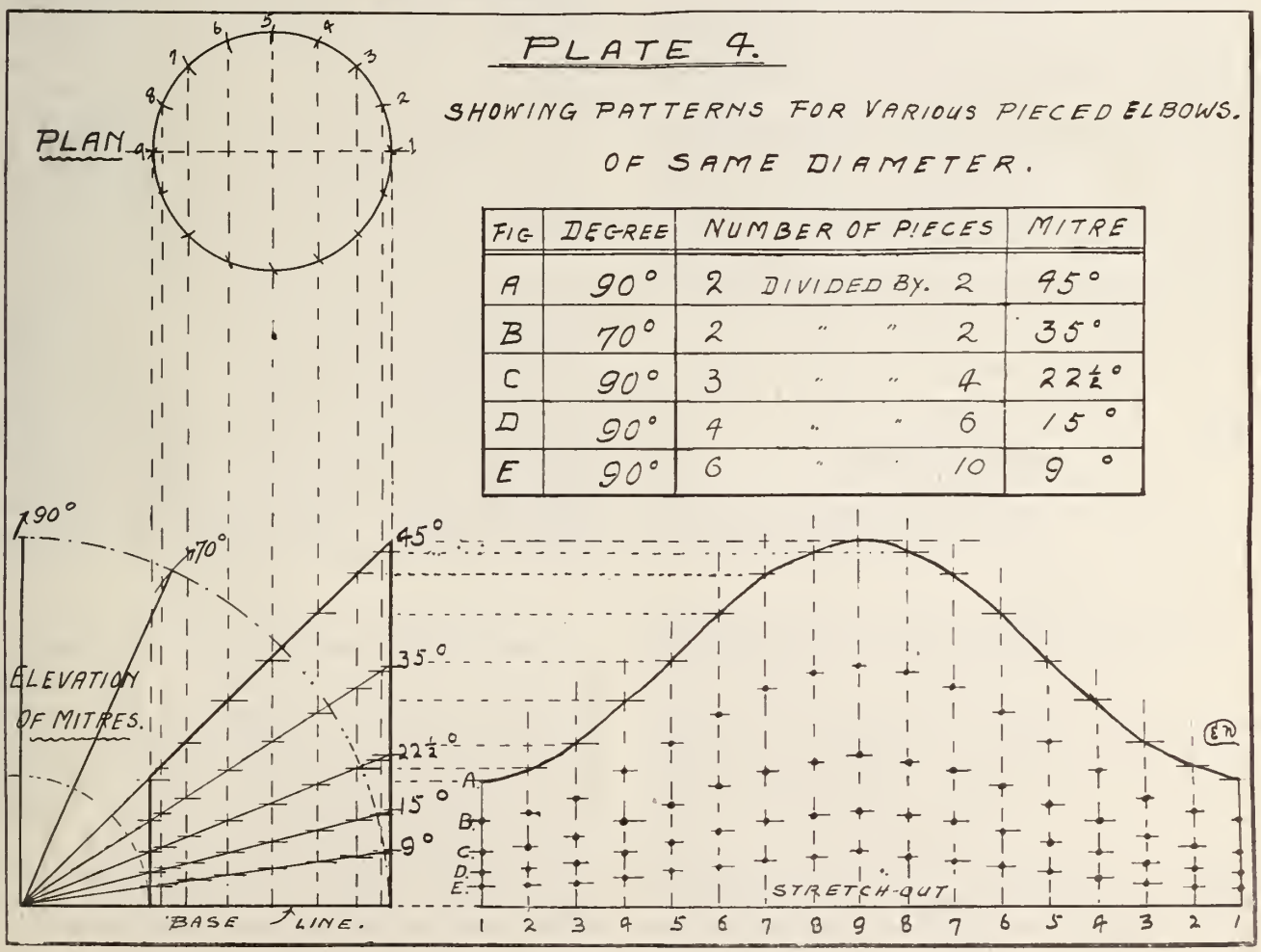

FIG.	DEGREE	NUMBER OF PIECES	MITRE
A	90°	2 DIVIDED BY. 2	45°
B	70°	2 " " 2	35°
C	90°	3 " " 4	22½°
D	90°	4 " " 6	15°
E	90°	6 " " 10	9°

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John Bayne MacLean, - *President*
J. G. Lorriman, - - - *Manager*
Edwin Newsome, - - - *Editor*

Circulating amongst Sanitary, Heating and Ventilating Engineers, Gas Fitters, Sanitary Inspectors, City Engineers, Boards of Health Architects, etc.

TORONTO, JANUARY 15, 1915

Ontario Workmen's Compensation Act

THE Ontario Gazette contains the undermentioned announcement respecting the Workmen's Compensation Act of the Province of Ontario: The Workmen's Compensation Board hereby makes the following regulation:—

51—Any employer failing to pay assessment or special assessment, or any prescribed portion thereof, within fifteen days after notice thereof has been mailed to him by registered post, shall pay as a penalty for such default 5 per cent. of the amount unpaid; and, where default continues longer than one month after the expiration of such fifteen days, shall also pay as further penalty an additional one per cent. of such amount for each calendar month or fraction thereof such longer default continues. The regulation is approved by the Lieutenant-Governor in Council.

The Workmen's Compensation Board adopted the above regulation so as to provide a slight penalty for those employers who deliberately held back payment of their assessments, and thereby injured the proper operation of the Act. The Board wants to have all assessments paid promptly, either on the instalment option or in full, by the time such payment expires.

Price-Cutting and its General Effect

WE have entered upon another year. We are looking forward in hope that the year 1915 will end better than 1914 did. We one and all pray sincerely that the awful war we are waging will be ended ere the close. We are all looking forward toward a better business relationship between all businessmen. We are all waiting for "the ship to land." What ship?

There are thousands of men and women waiting for "that ship to land," but how few of them have ever launched one, they look for a ship which has never set sail. Businessmen are hoping that the evil of price-cutting will soon be banished. One sanitary and heating engineer stated the other day that he had given eight tenders out and had just received word that he was too high and had lost all the jobs. Well now, there is nothing remarkable in that, when we reason out the fact that there are 25 or 30 firms looking for those eight jobs, but in looking over the figures which were tendered it was found that had this man got all the eight jobs he would have been over $1,000 out of pocket. One job, the smallest of the lot, only showed a chance of making about 10 per cent. after all overhead expenses were allowed for.

In these days every manufacturer or jobber is anxious to do business and to capture an order at any price, looks upon each job secured as something of a victory, particularly in the sanitary and heating engineering business. The same with the sanitary and heating engineer. The facts are that price-cutting prevails on all sides, and in spite of that, orders are not plentiful.

Has it ever dawned upon our readers what the evil of price-cutting is father to? It demoralizes every one engaged in it, both the one giving a cut price and the one receiving it. It demoralizes the employee to a great extent, and in this way a sanitary engineer has been successful in capturing a contract at a cut price. All goes well for a time, his men are well on with the job and the employer begins to sit back a little, and takes a look over the amount of material being used, and also begins to see that the job is going to take longer to do than he figured on. He goes to the job and everything seems to go too slow for him. Then he takes his men to task and says they must be half asleep on the job, etc., etc. Result—worse than nil. The men become discontented and take less interest in their work. Whereas a fair price and careful estimating and no price-cutting will establish not only one's own reputation, but also greater confidence between employer and employee. The only men in this world who have established a good all-round reputation are those who have always been willing to pay the best salaries, demand the best labor and charge a fair and honest profit and have not resorted to underhanded practices of price-cutting, either giving or receiving.

Sewage Disposal for Rural Homes

IN the next issue of The Sanitary Engineer we purpose to publish a series of articles dealing with the problem of sewage disposal for country homes. It will be highly illustrated and written in the most simple manner possible. Every reader of The Sanitary Engineer will find this series of great value, particularly at this season of the year.

The subject should be also very interesting because of the fact that for several years to come there will be fewer buildings going up in our large cities,

and the farmers and residents in country districts will be the most prosperous. Sanitary engineers should cater more than ever for country trade, and to do so successfully, every phase of sanitary science must play an important part. No rural home can lay claim to being sanitary, unless there is some sound, sanitary and efficient method of sewage disposal. Another feature about this series of articles will be that no systems will be mentioned which would not be endorsed by the Medical Health Officers of the various Provincial Health Departments.

Ontario Steam Boiler Act

ON other pages there is some reference made to the Ontario Steam Boiler Act, which act also includes steam heating boilers.

This act is not by any means a new one, having been in existence since July 1st, 1913. It has not been actually enforced until recently. In discussing the matter with the chief boiler inspector, it was pointed out that a letter had been mailed to all steam heating engineers in Ontario, with a view of informing them that all steam boilers installed from now on must conform with the act

Every boiler must be accompanied by one of the documents as proof it has been passed by the Boiler Inspection Department.

One or two outstanding features of the boiler regulations are that "All heating boilers must be stamped 'for heating purposes only.'" See clause 8.

Clause 106 deals with the safety valves and demands that every boiler be provided with a cock pop safety valve of approved design under the following conditions:

The springs and valves are to be cased in so that they cannot be easily tampered with.

Provision is to be made to present the valves flying off in case of springs breaking, etc.

It is also necessary under the act to equip every steam boiler with at least one fusible plug. Clause 113 deals with this matter as follows:

"Every boiler shall be equipped with at least one fusible plug, which shall be kept in clean and efficient condition. The body of the plug shall be composed of brass and a taper hole through its centre, the smallest diameter of this hole to be at least 3/8 of an inch, to be filled with good banca tin to efficiently protect the fire line when the water falls below the minimum water level prescribed, and shall project through the sheet not less than 3/4 of an inch and be located as shown and approved in design. All fusible plugs must be renewed at least once each year and examined at each washout."

Steam gauges must also be of approved kind as well as water columns and gauge cocks.

The College and Practical Education

HOW often do we meet a sanitary and heating engineer whose greatest ambition is to send his boy to college and thus open up for him opportunities which did not exist in his, the father's, time. The boy, after having passed through the University, finds, however, that the value of technical education in itself was greatly over-estimated by his father and that its worth depends largely upon its ability to assist him in securing a practical education. He finds that his usefulness to an employer who needs an executive is measured largely by his knowledge of the comparative value of different lines of brass goods or the characteristics of some steam heating specialty made by different manufacturers, and other such facts.

The mechanic of to-day has a splendid opportunity to acquire the education that will be envied him by the purely college bred man, and one source of such learning is the advertising section of the better class technical journals. A comparison of the current numbers with those of but a few years ago cannot fail to convince one of the vast increase in educative value which they now contain. Those responsible for product publicity are realizing more and more that to serve their purpose, advertisements must be attractive, and to fully attain this condition, they must be instructive. In a valuable paper presented before the University of Toronto Engineering Society, it was admitted that a large number of the illustrations accompanying the paper were obtained from the advertising columns of periodicals.

The Trade Paper by Elbert Hubbard

I KNOW hundreds of high, prosperous business men, manufacturers, dealers, jobbers, craftsmen, and I cannot recall a single instance in which the mentally successful man does not read his specialized paper. He subscribes for it and he pays for it promptly.

When you subscribe for your trade paper and assimilate it, you are uplifted, inspired, given courage, pep, intellectual vim and vigor and enough trade information to make you free from the trials and tribulations which beset the man who "doesn't know."

These things all have a direct influence on the bank and mental balance.

The trade paper binds everybody in the business into a fraternity, which spells length of days, because it "serves" and its service is based on specific knowledge.

Editorial Briefs

TO BE OF the greatest service to mankind, one must be inspired by one's calling.

• • •

DOLLARS AND cents look like so much filthy lucre, when used in bartering for the results of inspiration.

• • •

THE LAW of Nature says: "It is more blessed to give than to receive." Giving creates perpetual interest, compounded.

• • •

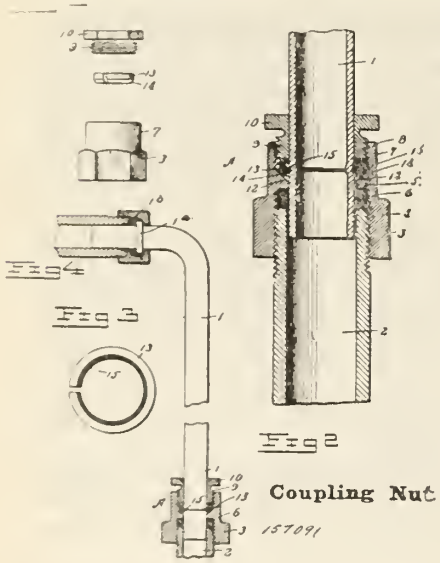
SUCCESS IS not measured by having acquired financial wealth, but rather by the fact of one's having rendered the greatest service to mankind.

New Canadian Patents

No. 157,091.

The H. Mueller Manufacturing Company, assignee of Anton C. Schuermann, both of Decatur, Illinois, U.S.A., 28th July, 1914; 6 years. Filed 15th May, 1914. Receipt No. 238,775.

Claim.—1. In a slip joint coupling, the combination with a pipe having external threads upon its end and a second pipe of reduced diameter telescoping into said first pipe, and having an exterior smooth surface, of a coupling member threaded upon the first pipe, and having an inwardly extending flange with a flat face opposed to the end of the externally threaded pipe and adapted for snug engagement against said telescoping pipe, a packing carried in said member against said flat face and adapted to be-



Coupling Nut

come pressed against said threaded pipe upon the screwing of said member upon the pipe, said member also having an integral threaded extension surrounding the telescoping pipe, said flange having an inclined wall facing outward through the extension, a split ring formed with an annular biting edge and arranged in the extension against the inclined face and a gland nut embracing said telescoping pipe and bearing against said ring, whereby to compress the latter against the inclined face and force said biting edge into frictional contact with the telescoping pipe to securely lock the same against longitudinal movement.

2. In a slip joint coupling and in combination, an outer pipe, a pipe telescoping into said outer pipe, a coupling member secured to the outer pipe and having a straight shoulder facing the end thereof, a packing between the end of the outer pipe and said shoulder and adapted to be compressed against said end by the coupling member, said coupling member also having an inwardly inclined shoulder, a locking member formed with a biting edge and bearing on the inclined shoulder, and a nut on the coupling member engaging the locking member and compressing the same against the inclined shoulder whereby to force said biting edge into frictional contact with said telescoping pipe thereafter and securely lock the same against movement.

3. In a slip joint coupling and in combination, an outer pipe, a pipe telescoping into said outer pipe, a coupling member secured to the outer pipe and having a straight shoulder facing the end thereof, a packing between the end of the outer pipe and said shoulder adapted to be compressed against said end by the coupling member, said coupling member also having an inwardly inclined shoulder, a locking member formed with a biting edge bearing on the inclined shoulder, and a nut on the coupling member engaging the locking member and compressing the same against the inclined shoulder to force said biting edge into intimate contact with said telescoping pipe whereby to distort the pipe and render the same incapable of longitudinal displacement.

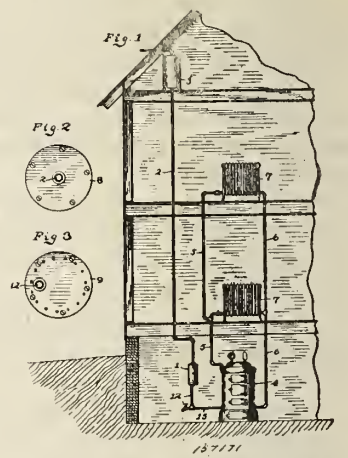
Marshall D. Tillman, Wabash, Indiana, U.S.A., 28th July, 1914; 6 years. Filed 12th March, 1914. Receipt No. 235,853.

Claim.—1. The method of generating pressure on a hot water heating system which consists in providing in the expansion line a plurality of pressure producing bodies of water in communication with the boiler and the radiating circuit, and interposing an elastic fluid body between the said pressure producing bodies of water, substantially as described.

2. The method of generating pressure on a hot water heating system which consists in breaking the water in the expansion line into a series of columns and interposing a series of columns of air between said columns of water and under the pressure thereof, substantially as described.

3. In a hot water heating system of the low pressure type, the method of establishing a pressure on the distributing line of the system which consists in interposing a column of water between the boiler and the open end of the expansion line, causing the water to drop from the upper end of said column of water through an inclined enclosed air space and interposing another upwardly rising column of water at the other end of said space in open communication therewith, and then leading the water through the expansion line, thereby forming alternate water and air columns, substantially as described.

4. In a hot water heating system of the low pressure type, the method of generating pressure on the distributing part of the system which consists in conducting the water from a heated source through the expansion line in a vertically rising column and then dropping the water from the top of said column of water through a downwardly inclined enclosed space to form a column of air under compression and conducting the water upwardly from the bottom of said



Hot Water Heating System.

column of air to form a third column of water, and then conducting the water through the main portion of the expansion line, substantially as described.

5. In a hot water heating system, in combination with a boiler and an expansion pipe, a plurality of connected tubular members mounted in the expansion line, substantially as described.

6. In a hot water heating system, in combination with a boiler and an expansion pipe, tubular members successively communicating at their opposite ends and providing alternate water containing and air containing chambers considered in the direction of the line of flow of water from the boiler, substantially as described.

7. A pressure generator for hot water heating systems having a series of in-

(Continued on next page.)

New Sanitary and Heating Goods

FLUE CLEANER.

Trelford Hardware Co., 1036 St. Clair avenue, Toronto, are offering to the trade the Common Sense Flue Cleaner here illustrated. The firm claim that the flue cleaner is easy running because it has a long shearing cut that shaves off the carbon perfectly with little effort. The springs are said to be made out of a high-grade steel, finely tempered, and will stand hot flues. The wear does not come on the springs, but on the heavier knives, and these knives are self-sharpening and adjustable for wear. The cleaner is adjustable and may be used in tubes one-quarter inch larger than listed. The cleaners are made in five sizes ranging from two-inch to four-inch.

Common Sense Flue Cleaner.

New Steam Main Vent.

One of the worst troubles with a one pipe steam system, is getting rid of the air. In spite of the fact that every radiator is as a rule automatically vented the air in many cases does not escape as quickly as it should. Then again the odor from such vents is not at all desirable. It has been found that to assist steam radiation to become more efficient, the mains, not only of a one-pipe, but also of a two-pipe system, should be effectively vented. The National Steam Specialty Co. have brought out a valve for that purpose which is to be known as their No. 10 vent valve.

It is substantially built 7½ inches over all, with a ¾ inch connection. It has various other features all its own —an encased expansion post and large copper float with ball seat are some of the others.

All literature describing this valve more fully may be procured by writing

New Air Vent No. 10.

to The National Steam Specialty Co., 24-26 South Clinton St., Chicago.

A CORRECTION.

(Continued from page 16.)

in a public building, office or factory building.

It might be well to allow a battery of not more than four lavatories on one 2-inch vented traps.

Clause 34.—Every trap, except on water closets, sinks and stationary wash tubs, must be vented either by continuing the vent pipe as in section 31, or by a special vent pipe extending above the highest fixture on it, but in buildings of more than two storeys every trap must be vented. The vents may be combined by branching together those that serve several traps. These vent pipes must always have a continuous slope to avoid the collection of water by condensation. Where proper air ventilation cannot be obtained, then, water closet seats must be back-vented, but not into stack.

The first part of this clause states that every trap except on w.c.'s, sinks and stationary wash tubs, must be vented, etc. Then it demands that every trap must be vented if the building is more than two storeys high. We do not see why these fixtures need to be vented because of the building being more than two storeys high, providing there are no fixtures on the upper floors. Even then there would be no need to vent the traps on the top floor if there were only one bath room, and every fixture were directly connected with the main stack.

Neither do we think that the sink and laundry tubs should be installed without their traps being vented. If they are connected into the soil pipe stack or house drain. The sink will, oftener than not, be connected into the stack and there will generally be a bath lavatory and w.c. on an upper floor, thus requiring the sink trap to be vented.

To make this a little more clear, let us suppose a residence is equipped as follows:

In the basement, a pair of laundry tubs, on the floor above, in the kitchen there is a sink and on the floor above that a w.c., bath and lavatory. Providing deep seal traps are used on lavatory and bath, the traps of these three latter fixtures do not require back-venting, but the sink and laundry tubs do require venting whatever trap is used, though we **are of the opinion that if a pair of laundry tubs were installed in the basement of a single house and not connected to the drain at all, they would be far more sanitary than if connected to the drain, when they would have to be vented and trapped as well.** The traps on these fixtures are often found dry because they are not often in use more than once a week; then when the fixtures, which are situated above, are flushed, there is a foul odor forced up through the unsealed trap. It would also be a great help to sanitary engineers if there were plans accompanying such a clause, showing exactly where and how traps should be vented.

NEW CANADIAN PATENTS.

(Continued from page 22.)

clined water receiving tubes, a series of inclined air tubes in communication at top and bottom with alternate water receiving tubes, in combination with a boiler in communication with said generator on one side and an expansion pipe in communication with the generator on the other side, substantially as described.

8. In a hot water heating system, in combination with a boiler and an expansion line, a pressure generator on the expansion side of the boiler provided with means in communication with the boiler to contain a plurality of columns of water, and means interposed between the water holding means to contain a column of air under the pressure of said columns of water, substantially as described.

Boiler Inspection in Ontario

Sanitary and Heating Engineers Will do Well to Study the Ontario Steam Boiler Act, Heating Boilers Are Now Under the Act, Whether Round or Sectional, Cast Iron or Steel Tubular.

THE Steam Boiler Branch of the Department of Public Works for the Province of Ontario has during the seventeen months of its existence done much good work and has widened considerably the scope of its operations. Readers of Canadian Machinery will note that the Steam Boiler Branch was formed to administer the Steam Boilers Act passed by the Ontario Provincial Legislature and which went into force in July, 1913. Originally the work covered only registration of designs and inspection of new boilers and fittings and which were destined to be installed in the Province, whether made there or outside. All manufacturers of boilers and fittings in the Province and those outside submit designs to be passed upon by the chief inspector who approves and registers those which are in accordance with the regulations.

Work of the Department.

As a further safeguard, all boilers are inspected upon completion to see if they conform to the registered design. This applies to boilers built in the United States and Great Britain as well as in Canada. The following is a summary of the examinations of designs of boilers and accessories, also shop inspections during construction of registered boilers and inspection of used boilers shipped to the Province or extensively repaired. The figures are for the year of 12 months, ending October 31, 1914. Up to date, however, 1,030 designs of new boilers have been registered.

Drawings and specifications of boilers surveyed and registered—314.

Drawings and specifications of boiler accessories surveyed and registered—195.

Drawings returned to manufacturers for corrections—201.

Registered boilers inspected by the department during construction—478.

Plates examined—2,963.

Plates rejected—9.

Registered boilers inspected by Insurance companies in Canada, who are outside the province—3.

Registered boilers inspected by Insurance companies in United States—37.

Registered boilers inspected by Insurance companies in England—10.

Used boilers inspected in Ontario—294.

Used boilers inspected in Canada, outside the Province—6.

Used boilers inspected in United States—42.

Used boilers inspected and refused admission to the Province—12.

Used boilers inspected and repaired under inspector's directions—69.

Used boilers inspected, the pressures for which were reduced—170.

Used boilers inspected and condemned—16.

Certificates issued for new boilers—478.

Certificates issued for used boilers—275.

Department Jurisdiction.

The department has no jurisdiction over boilers after they have been installed, or over those in operation. During the year, however, several investigations have been made into the cause of boiler explosions, notably that at Howick Hall, Ottawa, on June 25, where $100,000 damage was done; also a portable boiler at Kincardine, Ont., on September 11; Oshawa on June 25, and a number of minor explosions.

Recently the department has undertaken the inspection of repaired or rebuilt boilers in accordance with Section 4 of the Steam Boilers' Act. It is also undertaking the inspection of boilers built for heating purposes but, in this case, shop inspection is not forced, especially with regard to sectional boilers. In lieu of this, an affidavit must be furnished by the maker stating that the boiler conforms to the registered design approved by the department. In return, an official certificate is issued for boilers operated at a pressure not exceeding 15 pounds.

An important conference of Canadian boiler inspectors was held last June in the Parliament Buildings, Toronto, and was attended by representatives from the Provinces of British Columbia, Saskatchewan, Quebec and New Brunswick, Ontario being also represented. The chief business of the conference was to draw up uniform regulations for boiler construction and inspection for the whole Dominion. Considerable progress was made towards that end, a few points not agreed upon being left open for settlement by correspondence. It is anticipated, however, that a code of rules will shortly be adopted as being generally acceptable.

The work and scope of the department has increased considerably, and more accommodation for the staff has had to be found. A fine suite of rooms has now been placed at their disposal. Several interesting exhibits of badly pitted boiler plate have been secured, also a number of sample fittings. The technical nature of the work demands a highly trained staff of inspectors and draftsmen and in this respect D. M. Medcalf, the chief inspector, is ably supported. The work carries with it considerable responsibility, but the department is well and efficiently organized to meet all demands made upon it. By its efforts, life and property are being safeguarded and boiler inspection placed upon a sound basis. Hon. Findlay G. MacDiarmid, Minister of Public Works, is taking a deep interest in the work which augurs well for its future effectiveness.

ONTARIO BOILER INSPECTORS' QUALIFICATIONS.

THE following statement of suggested qualifications for inspectors of steam boilers has been drawn up by the Steam Boiler Branch of the Department of Public Works, Province of Ontario. The necessity for some definite public information on the subject is obvious, enabling as it does those who may aspire to the position of inspector to qualify themselves. In addition it provides a definite basis of testing candidates by examination. The regulations given below were drawn up by D. M. Medcalf, chief inspector, with the assistance of his staff. It is proposed to put them in force at the earliest opportunity.

1.—The applicant must be a British subject between twenty-five and fifty years of age.

2.—He must have been employed for at least five years as apprentice or mechanic, or both, on the making or repairing of boilers and engines.

3.—He must have sufficient knowledge of mathematics to make calculations from the formulae used in connection with boiler construction, suspension material for boilers, safety valves, etc.

4.—He must possess a knowledge of the theory of stress and strain sufficient to be able to deduce the ordinary rules for the calculations of the direct stresses and magnitude of the stresses on boiler

shells, furnaces, and combustion chambers.

5.—He must be familiar enough with chemistry to understand and explain incrustation, corrosion, pitting and electrolytic action in steam boilers, and must know what to do to prevent them.

6.—He must be prepared to give illustrations of how defects have arisen from accident, imperfect construction, deterioration, or other causes; how these defects might have been prevented, and the best method of repairing such defects.

7.—He will be required to make free-hand sketches of boilers and parts of same, and mark in, without copy, all necessary dimensions in figures so that the sketch could be worked from.

8.—He must be prepared to answer questions showing that he is familiar with the provisions of the Steam Boiler Inspection Act Rules and Regulations.

9.—He must be acquainted with the principles of expansion of solids, liquids, and gases, and the modern theory of heat, its transmission through solid plates from fire to water, and how it acts upon the plates under various circumstances during the generation of steam in the boiler.

10.—He must be able to make sketches and give descriptions of boilers, and the methods of staying them, and must show that he possesses a clear knowledge of the theoretical principles which regulate their construction, and of the practical application of same in the workshop.

11.—He must understand the general properties of all material used in construction of steam plants, the method of making physical tests and the determination of the value of material tests made.

12.—He must have a thorough knowledge of safety valve construction and operation, and the principles involved in determining the size of a safety valve.

13.—He must understand the general principles involved in the construction of the barometer, thermometer, pyrometer, steam and water gauges.

14.—The candidate may, with his application to be examined, send in questions set by himself and worked in his own way without a book; this to give him an opportunity of showing to the best advantage what he knows. Questions based on these examples will afterwards be put to him to test the soundness of that knowledge.

15.—To give scope for testing the knowledge and reasoning powers of the candidate, the examination questions may be framed upon any well understood subject relating to the work which is to be undertaken by the inspector.

The foregoing regulations to be sent to applicants along with form No. 3.

ONTARIO STEAM BOILER ACT.

The following letter has been sent out by the office of the Inspector of Steam Boilers of the Department of Public Works, to every sanitary and heating engineer in Ontario:

Toronto, Jan. 6th, 1915.

Gentlemen:

A misunderstanding as to the requirements of the Steam Boilers Act appears to continue among some of the master steam fitters throughout Ontario in reference to the installation of steam boilers to be used for heating purposes only and to be installed in buildings other than those exempt under the Act. I therefore desire to inform you that a certificate must be issued by this branch of the Department for all such boilers which must be constructed from a design approved. And it must be clearly understood that the safety valves for all heating boilers must be of approved pattern, and have an area in accordance with Section 107 of the 1914 issue of our Regulations.

I wish to further inform you that all steam piping arrangements for power purposes must be submitted for approval in a manner similar to boiler designs. The fees in connection with the examination of power plant piping will be found in Section 5 of our Regulations.

I trust that the foregoing is clear, and hereby respectfully notify you that it shall be a contravention of the Steam Boilers Act to instal boilers or steam piping unless our requirements as stated above have been complied with.

Yours truly,

D. M. MEDCALF.

Chief Inspector of Steam Boilers.

PROBLEMS FOR SHEET METAL WORKERS.

(Continued from page 18.)

as centres and C-B as radius draw two circles. With E and C as centres, and E-C as a radius, draw arcs to intersect at G and F. From G and F draw lines through E and C to cut the circumference of the circles as at 1, 2, 3, 4. With F and G as centres and F-2 as a radius draw arcs 2-3 and 1-4 which complete the curve.

Fig. 5.

An ellipse being given, find the transverse and conjugate axis. To do this draw any chord as A-A, parallel to this chord A-A draw another chord as shown at B-B. Bisect the chords A-A and B-B and draw a line through the centres to cut the curve of the ellipse as at C-D. Bisect the line C-D as at E. With this point E as a centre, draw a circle to cut the curve of the ellipse at four points, as F, G, H, K. Next draw lines joining F-G, G-H, H-K, and K-F. Bisect F-G, G-H, H-K, and K-F, and extend lines drawn through their centres to cut the ellipse at M-N, O and P. M-N is the transverse axis and O-P the conjugate axis.

Fig. 6.

To draw an oval of a given width as A-B. Draw a circle with its radius equal to one-half of A-B. Draw a diameter at right angles to A-B as C-D. From A and B draw lines through C extending them past circumference of circle. With A and B as centres and A-B as radius draw arcs from B and A respectively cutting lines drawn through C, as at E and F with C as a centre and C-E as a radius draw are E-F completing the oval.

WHY MANY FAIL IN BUSINESS.

(Continued from page 15.)

Here we have an overhead expenditure to the amount of $1,500.

Now the next question is to find out how much business must be done to meet this expense.

Some men will adopt a rule of thumb method and decide to double on salary, and charge all time at 80 cents per hour, and adding 10 per cent. on invoice cost of material. But such is a very poor method, because, from the very start, this will not, and cannot be carried out. We are now speaking of a single individual starting by himself and doing the work himself.

First he may be called upon to give an estimate on certain work and spends say three hours on it, finding that his price is too high and he does not get the job, he right there goes behind $2.40 on salary besides about 40 cents of the other expenses, making a total loss of $2.80, and so on all along the line.

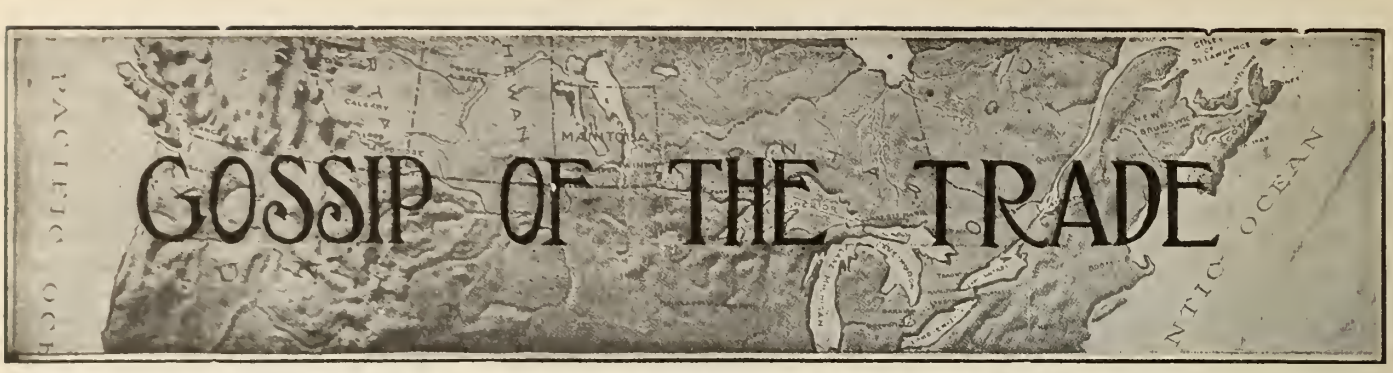
Of course it may work out alright for the first year or so. One may be able to make good by working a little extra overtime, etc., but the next rub comes, when it is found necessary to employ one or two men. These men must be watched, and between submitting "estimates free" and looking after the two men, the boss cannot execute any work which can be directly charged to some specific bill and figured in as "cash receivable."

These and all such problems must be considered very carefully before one one should become involved by "hanging out his shingle."

(Continued in next issue.)

Perseverance.

There are two ways of attaining an important end—force and perseverance. Force falls to the lot of the favored few, but the severely simple perseverance can be practised by the most insignificant. Its silent power proves irresistible with time.



Toronto's Water Is Pure.

Dr. Hastings stated recently that only once in the last 12 months did the dreaded colon bacillus find its way into the samples of the Toronto water analysed. Analyses on December 30th and January 2nd showed the water to be exceedingly good.

Burns Proved Fatal.

William Robinson, 226 Rhodes Avenue, Toronto, who was severely burned in his plumbing workshop, succumbed to his injuries a few days later. Robinson was burned when the fumes of a quantity of gasoline, which he had stored in his shop, exploded when he attempted to light a fire in the workshop stove.

Ontario Boiler Regulations.

The Hon. Minister of Public Works for the Province of Ontario has issued a book of regulations in connection with boilers of every description. Not only do stationary, locomotive and other high-pressure boilers used for power purposes come under the act, but boilers used for low-pressure heating as well. All heating engineers should become conversant with the Act, and may do so by writing for further particulars to D. M. Medcalf, Chief Inspector, Provincial Public Works Department, Parliament Buildings, Toronto.

Sanitary Engineers Elected.

The town of Port Hope elected as mayor H. T. Bush, Esq., of the Standard Ideal Co., Ltd., Port Hope.

Chatham, Ontario, elected J. W. Draper, sanitary and heating engineer, as mayor for 1915.

Burlington, Ontario, elected as Councillor J. T. Matthews.

Cobourg, Ont., honored J. E. Quinn by electing him as one of their Councillors.

Mark Hermiston was elected Deputy Reeve for Cornwall.

For Sanitation and Civilization

The plumbers of the United States, as a corporate body, are making formal protest against the newspaper jester, who considers this most useful of all domestic engineers fair game under any circumstances. After all, perhaps Tom. Phillips's way is the best. He good-naturedly lets the other fellow laugh all he likes, and evens the thing up by laughing back, knowing well that the plumber is dispensable only in the most uncivilized communities, and that he gives as good value for the money he gets as the average man in other lines of business.

"Tho' the newspapers jest,
At our bills they do roar,
When e'er they're in trouble,
We're right at their door."

A Correction.

In our last issue there appeared a question entitled "What size of septic tank?" The finish of this article should have read as follows: "The amount of tile pipe to be used should be from 13 to 15 lineal feet of 4-inch field tile to every cubic foot of contents in the tank when full. This amount would be necessary to hold the full contents at one discharge. The method of laying the tile pipes is shown in Fig. 1 given below."

New Addition to Ford Works.

The Ford Automobile Factory at Ford, Ontario, is being enlarged. This will make this factory the largest of its kind under the British flag. The sanitary and heating installations are the very best that could be desired.

One of the very latest heating schemes has been worked out by Wells & Gray, the Toronto contractors, whereby all supporting pillars in the building will be hollowed out to carry the tempered air, which will be distributed from the roof. A complete elimination of steam pipes and heating apparatus is the result, so that 100 per cent. floor space may be used. The present Canadian Ford factory and the plant at Detroit were the first to adopt this novel heating arrangement.

The process of "healthifying" Ford air will be handled in pent-houses at the top of the building. All dirt will be "washed" out and the air passed on to be properly heated or cooled as the case may be. A fanning system starts the circulation, while open registers in the hollow columns on each floor near the ceiling deliver the warm air. In hot summer months it will be equally efficient for cool air.

Progressive Sanitary Engineer.

In the year 1912 Mr. W. H. Oulton purchased the plumbing business of Mr. Amos Lawrence, who had been engaged in business in Sackville, N. B., as a plumber, tinsmith, etc., for over eighteen years. Mr. Oulton soon proved to the public that he was capable of handling such a business and held the customers so well catered to by Mr. Lawrence. He soon found that it was possible to carry other lines in connection with the business taken over from Mr. Lawrence and added a full line of shelf hardware of the best quality. Mr. Oulton conducts his business in the Oulton Block and a visit to his establishment would convince one of his success in his particular business. Besides handling hardware he deals in stoves and fittings, tungsten lamps, etc. He gives special attention to plumbing of all kinds, tinsmithing, furnace installation and repairing, and general repair work such as is done by a tinsmith and plumber. Several men are employed throughout the year. This year has proven a good one with Mr. Oulton which would go to show that the work done by him gives satisfaction.

In addition to being a successful business man, Mr. Oulton has proven himself a valuable citizen. He has been elected to the council board of the town three successive years and during the last two years has occupied the very responsible position of chairman of the water and sewerage committee of that civic body.

Charge the Kaiser.

The plumber boy to the war has gone,
In the army ranks you'll find him;
His soldering iron bravely shone,
And his spirits of salts behind him.
Dear was the plumber boy to all,
Mean was he as a miser.
Oh! let him not in the battle fall
Until he has charged the Kaiser.

—Sydney Bulletin.

Always take the short cut when it brings you to the same goal.

Gasolene Tanks for Motor Boats

Editor The Sanitary Engineer:

We run a tinshop in connection with our sanitary and heating business, and have been called upon to make gasoline tanks for a motor boat builder. We understand there is trouble sometimes with the gasoline surging through the air vent of the plug. Can you show us what will prevent this?

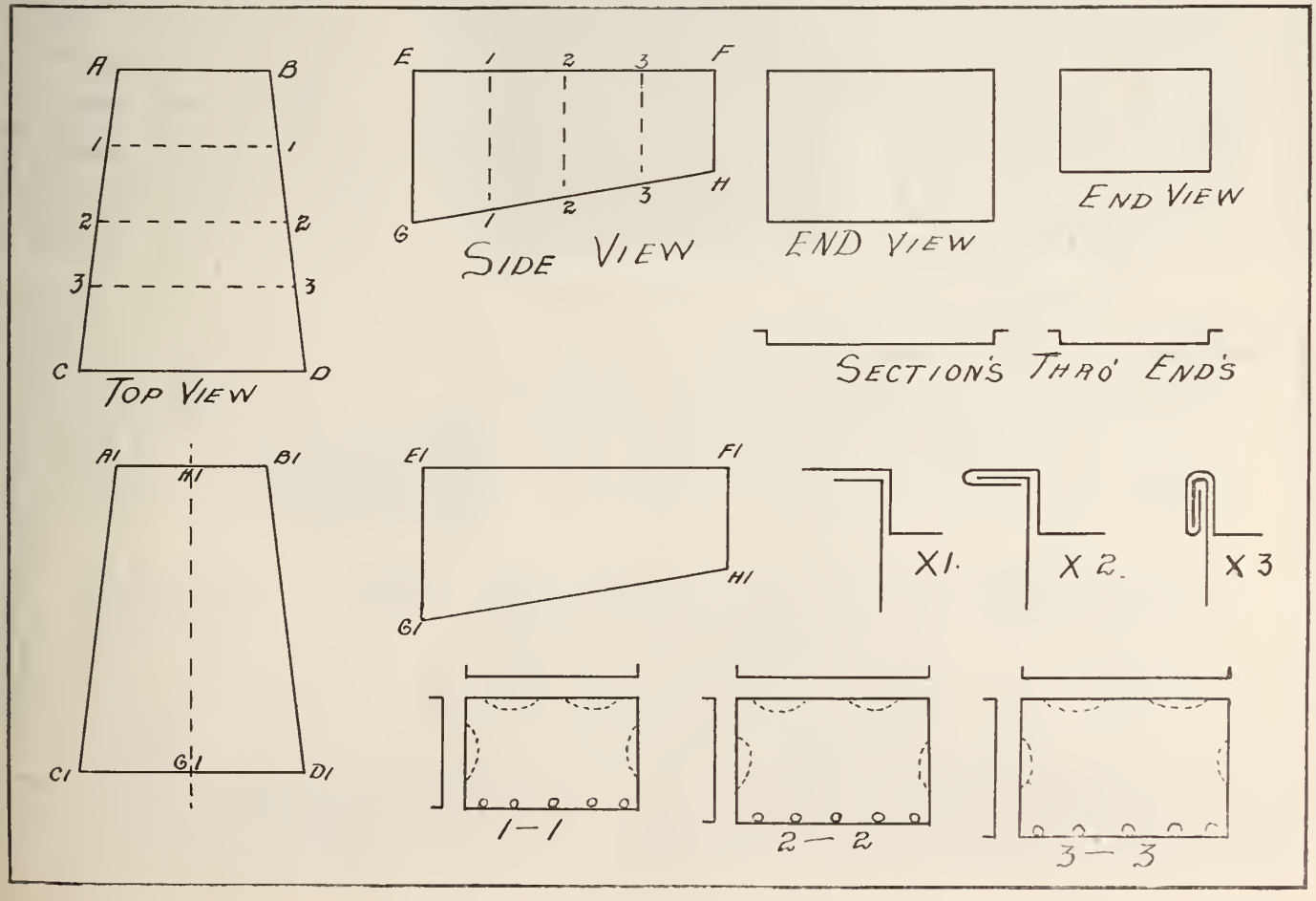
NEW SUBSCRIBER.

Replying to New Subscriber, we here show how these tanks are made. The article in this problem is a galvanized iron tank often asked for by motor boat builders and owners when fitting up their boats. As a small leak would cause considerable trouble, the tinsmith in making a tank must exercise great care. The tank as shown here is of a fairly regular pattern or design, yet in some instances the nature of the space in which the tank is located requires a very irregular shaped tank.

In the top view or plan, the three dotted lines 1-1, 2-2 and 3-3 show the position of the plates or partitions usually put in to keep the contents of the tank from splashing too freely in the tank, through the motion of the boat, thus putting too much strain on the joints and seams of the tank.

In the development of the patterns necessary to have a plan or top view and side view. In this case let A, B, C, D be the outline of the top view and E, F, G, H the outline of the side view. The top of the tank being square with both ends, the top view is also the outline of pattern of top section. The line G H in side gives the length of bottom section. Draw a line as at G 1 and H 1 and square from this line. At these points draw lines on both sides and at one end G 1. Mark on each side half the distance from C to D. At H 1 mark on each side half the distance from A to B. Connect the points thus obtained forming outline A1, B1, C1 and D1, being pattern of bottom.

The length of side is shown by lines A C and B D of top view. Draw a line as E1—F1 equal in length to C A in top view. Draw lines at right angles to E1 and F1. On line drawn from F1, mark off a distance equal to E G on side view. From F1 mark off the distance from F to H in side view. Connect points G1 and H1, thus obtained, completing pattern of side. The two end pieces are square or rectangular pieces as shown in the two end views. The section through ends show edges turned on end pieces. At X1, X2 and X3 are shown the three operations in fitting on end pieces. This seam is doubled over from the outside, making the ends very secure. At 1-1, 2-2 and 3-3 are shown the three portions which are put in before ends are seamed on. These are either punched or cut out as indicated by dotted lines.



Too Busy to Read.

He is a familiar type—the fussy, fretful man who imagines that he is about the busiest fellow in town. He often dumps in the waste-basket, unwrapped copies of business or technical magazines that contain valuable articles bearing directly on his problems. He fondly believes that he is too busy practising to bother with what others are "preaching."

The trouble with this type of man is that he has not learned that the real executive is the man who so plans his work as to leave a reasonable amount of time for reading and planning.

There are shoals and breakers ahead when the accumulation of new ideas ceases.

The man who declares he has no time to read is unconsciously advertising his small calibre, his slavery to detail, his arrested development.—Printer's Ink.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

How to Cure a Noise.

Editor The Sanitary Engineer,

Dear Sir.—We enclose herewith a rough sketch of a bath apparatus lately installed here and which is not giving satisfaction. We would be greatly obliged if, in your next issue of Sanitary Engineer you will give us your advice and suggestions for overcoming the trouble stated below.

The rough sketch will fairly explain itself. The boiler is on the same floor as bath and is connected with water-front as shown, which is about two feet away. The hot water pipe for bath is taken from top of boiler, drops under floor, runs a distance of about 10 feet and rises to bath tap. The cold water supply tank is about 1 foot higher than top of boiler and the supply pipe is taken through top of boiler as a stand pipe to within a foot of bottom of boiler. The original trouble was a constant thumping and shaking when anything of a fire was going, and the hot water was forced up the supply pipe in the cold water tank. To overcome this latter difficulty, a ⅜ vent pipe was taken from top of hot water pipe as shown, with the open end discharging over the tank. This was done with the idea that there might possibly be air accumulating at the top of the boiler and causing the hot water to back up the supply pipe. This vent pipe has apparently cured this, but there is still the kicking and thumping going on to an even greater extent when there is a good fire in the stove, and the water is occasionally forced through the vent pipe over supply tank. This is, however, only intermittent. Can you advise us what steps to take to cure this kicking and thumping nuisance? It seems to us that there is undue pressure on the boiler when there is a large fire on, due to some obstacle to free circulation.

Yours truly,

BATH SUPPLY.

The trouble with this installation can be accounted for in several ways. The water-front may be too large, or the boiler too small. There is, however, one thing which would account for the trouble as well, and that is the style of connection between the water-front and range boiler. We have never seen a range boiler with tappings the same as those which appear on the side, as shown in Fig. 1, the sketch submitted by "Bath Supply."

The vent would also have been more effective if taken off as shown in Fig. 2. The proper method for connecting water-fronts and boilers is shown in Fig. 2. Further, unless there is a large amount of hot water required, we do not think it is necessary to use a larger size of pipe that ¾-inch, whereas we note that "Bath Supply" has used 1-inch pipe. There are two very common reasons in this installation which would account for the rumbling noise. These are, first, improper connection at boiler and water-front, which prevents circulation, and second, when water is drawn off the cold water enters the boiler and meets the water which we suppose gets very hot;

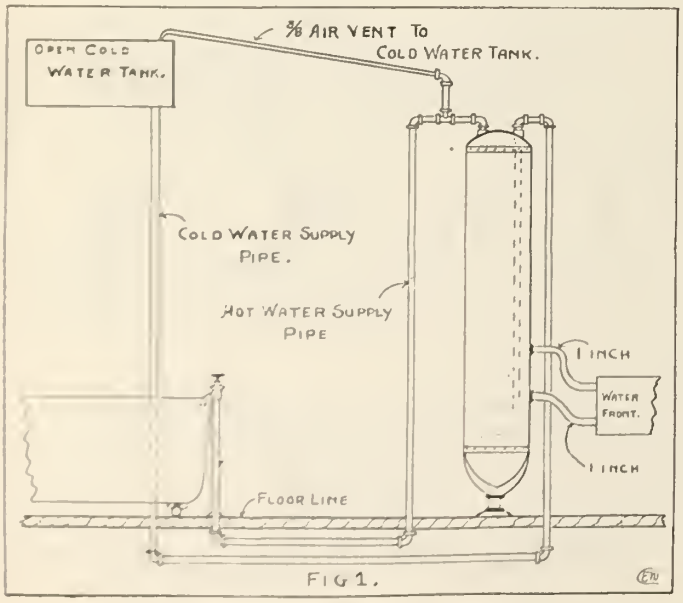


FIG 1.

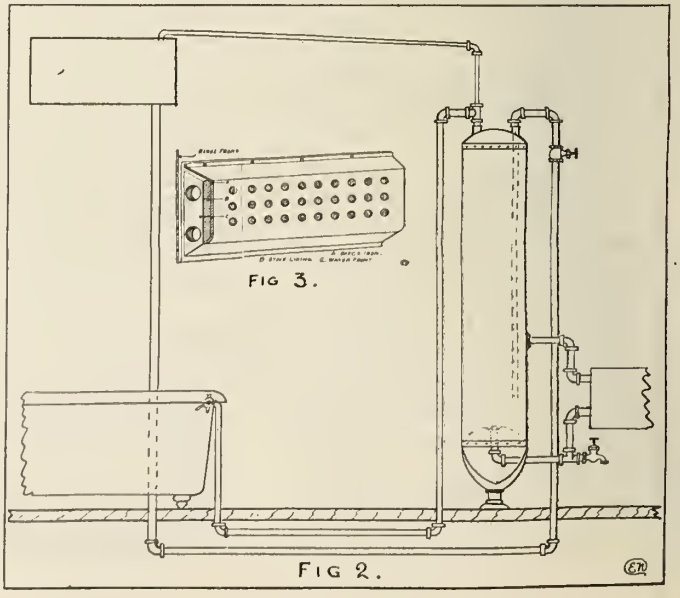


FIG 3.

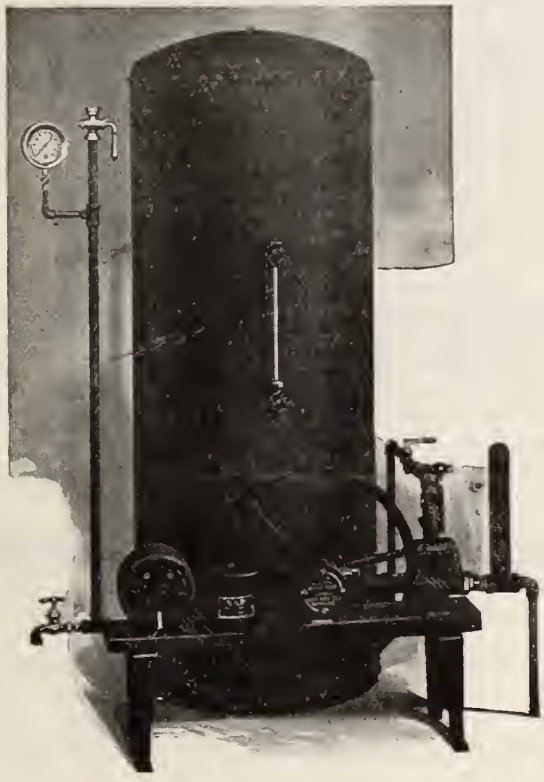
FIG 2.

Have You Ever Looked to Your Surrounding Country Districts for Business?

Owing to the unfortunate war conditions in Europe the farmer is the most prosperous man in Canada to-day. He is getting more for his crops than he has for some previous years, and it is not only in your interest, but your duty, to see that this extra money going to him is kept in circulation.

Make him a visit to-day and show him the necessity of installing a complete water supply and sanitary system.

System No. B4, including tank, pressure gauge, water gauge, pump, electric motor and automatic switch, relief valve, ½-inch stop, ¾-inch stop and waste, and ½-inch compression bibb tank, 30" x 6 feet



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capacity — 220 gallons, vertical lift of pump 18 feet—will discharge to height of 75 feet and supply five ordinary house fixtures; pump automatically starts and stops by electric switch.

We have a large variety of outfits for every kind of domestic service, including hand, electric, water and power driven, deep and shallow well pumps. Write us for information and prices. We are sure that there is a large field for business open to you if you only go after it, and we wish to help and co-operate with you in every way possible.

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because on the one hand there is not the amount of water drawn off before it gets excessively hot, and the cold and hot water meeting sets up a kind of explosion, which spends itself by creating a rumbling noise. If there is no improvement after the change of connection is made between the water-front and boiler as shown in Fig. 2, we would suggest that a portion of water-front be covered as shown in Fig. 3. This is a sectional view of a water-front with the whole surface covered. A portion could be covered in the same manner, thus reducing the heating surface of the water-front.—Editor.

Shape of Hot Air Furnace Top.

Editor The Sanitary Engineer:

I have been called in to see a job of warm air heating and to my mind the furnace is not the right shape; the cellar is a fairly good height and lots of head room. The furnace gets hot as well as the whole of the cellar, but they cannot get the heat through the pipes. I have enclosed a sketch showing one pipe taken off the furnace. There are five pipes nearly all the same length. Can you please say what would remedy the trouble?

Tinshop Trouble.

In the first place the construction of the furnace top and method of taking the warm air pipes is not the best. See Fig. 2, which is sketch submitted. The furnace may be too small, or it may require a thorough cleaning out; every opening should be examined and thoroughly cleaned, and the top be taken off. Possibly the dome of the radiator is in interior of the furnace is covered with ash dust. If this is done first and there is no improvement, the top of the furnace should be altered. The method shown in Fig. 2 is such as to create a lot of friction. We show an improved method in Fig. 1. It will be seen that there is very little obstruction in the airways to the registers. Covering all the pipes with air-cell asbestos paper will assist this furnace to give better satisfaction, and not heat the cellar up too much.—Editor.

Sanitary Conditions Essential to Healtry Homes.

If the twentieth century is to be marked by Canada's expansion, and no one doubts the statement, it is in the highest degree essential that we should be wise and see to it that none of the evils incident to the development of the great industrial centres of other countries, particularly in the way of insufficient, inadequate and improper housing accommodation, scar the fair name of Canada.

Let it be said of Canadians that we have been wise, and, by the early adoption of preventive measures, have endeavored to obviate errors in town-planning and housing. These will no longer be possible if adequate powers be given to health authorities to condemn, and if need be, destroy the house which is not a home. Along these lines the Commission of Conservation is working, in the hope that our provincial governments will, at an early date, adopt the necessary legislation, and what is more essential to the successful carrying on of the work will establish provincial boards or commissions to direct and supervise the work which is of a peculiarly technical character. To attain this end, the assistance of the public is necessary, for it cannot be too clearly understood that sanitary reform in this direction waits on public opinion. Without this impulse from the people, no substantial housing reform is possible. This was the opinion of the Royal Commissions of Great Britain on Overcrowding in 1884, and the words are worth repeating here: "What, at the present time, is specially required is some motive power, and probably there can be no stronger motive power than public opinion. We require an awakening of civic conscience and a well-informed and active public opinion."

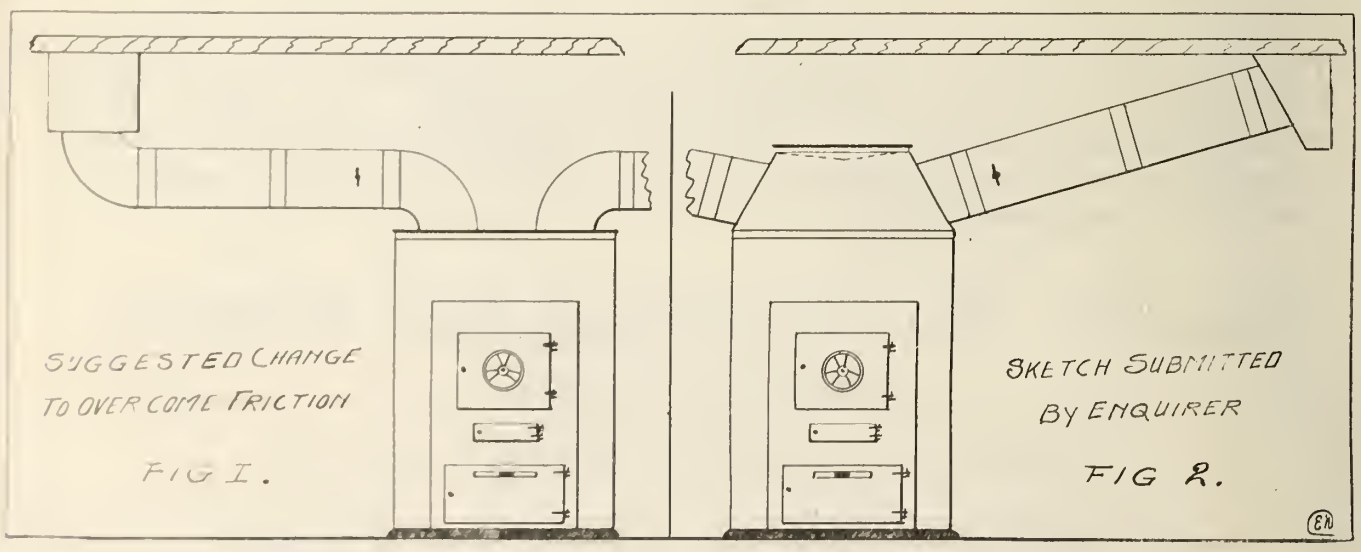
Facts and Figures.

The Blue Book of Facts and Figures issued by the Canadian H. W. Johns-Manville Co., Toronto, deals very thoroughly with the J.-M. Sea Rings, which are also referred to as the Ideal automatic packing. The catalouge states how this packing is made, the purposes for which it can be used, and the reasons why the different materials are employed. One illustration is of especial interest, as it shows a number of dimensioned sections with the view to drawing the reader's attention to the precision and accuracy employed in the manufacture of the packing. Other products described are the J.-M. Permanite sheet packing and flange gaskets. All the products are illustrated and views are included of the company's plants and offices.

Build Up the Home Town.

If you want to live in the kind of a town,
Like the kind of a town you like,
You needn't slip your clothes in a grip
And start on a long, long hike.
You'll only find what you left behind,
For there's nothing that's really new.
It's a knock at yourself when you knock your town.
It isn't your town—it's you!

Real towns are not made by men afraid,
Lest somebody else gets ahead.
When everyone works and nobody shirks
You can raise a town from the dead.
And if, while you make your personal stake,
Your neighbor can make one, too,
Your town will be what you want to see,
It isn't your town—it's you!



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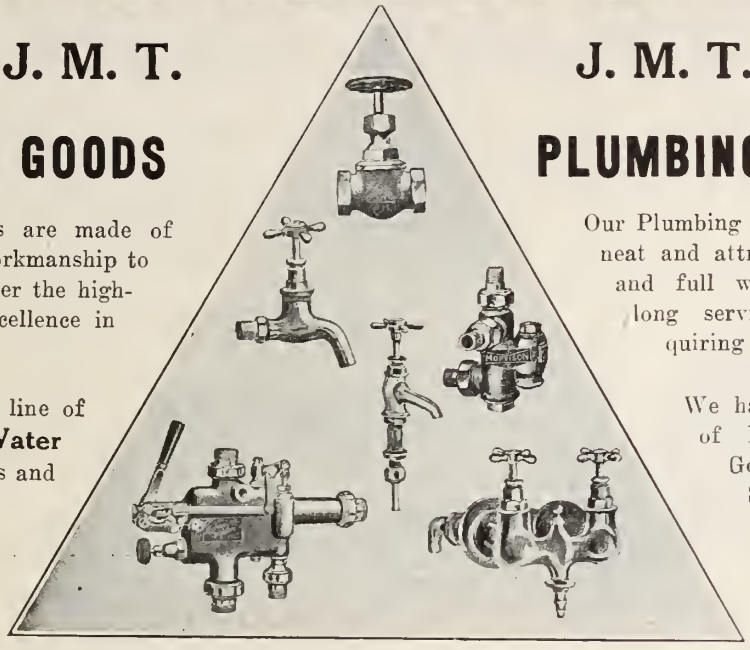

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We handle a full line of Enamelled Iron Goods and Sanitary Supplies for use in modern building construction.

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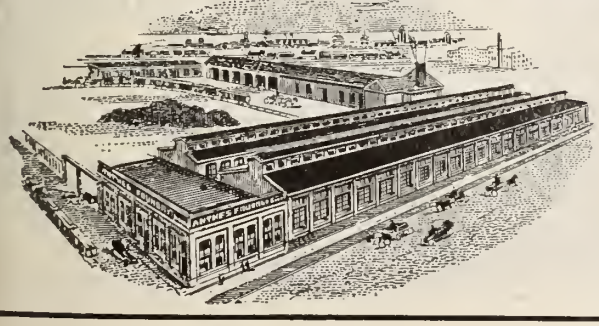

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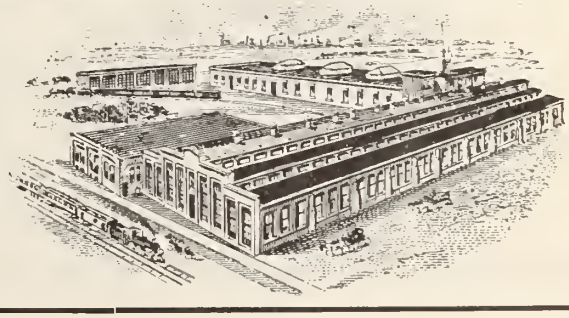

ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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All this in pursuance of the new idea—to increase business by pleasing the public.

This new idea is well handled in an article in the January issue of MacLean's Magazine. No business man can afford to miss this article. And it's only one of a dozen others in

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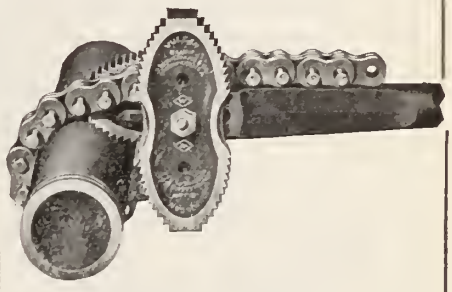

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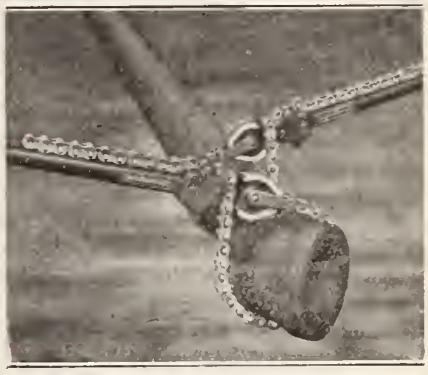

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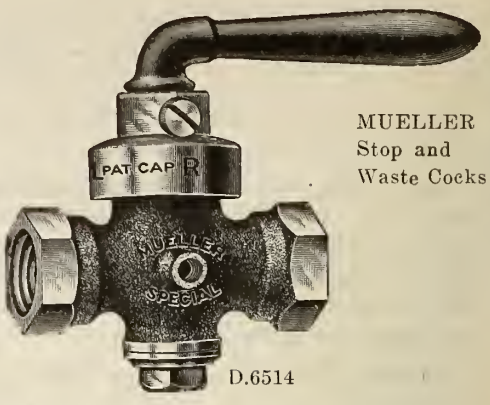

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Hundreds are doing this in their spare time. Others at first give spare time, but find it to their advantage to give it their entire time. If you desire to increase your income in this way, write us at once. We give you all the requirements for success, except the determination.

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WRITE FOR CATALOG

Classified Buyers Guide

Occasionally advertisements are inserted in the paper after this page has gone to press. The insertion of the Advertiser's name on this page is not part of the advertising order, but is inserted solely for the convenience of the reader of the paper.

Asbestos Goods.

Can. H. W. Johns-Manville Co., Ltd., Toronto.

Air Line Systems.

C. A. Dunham & Co., Ltd., Toronto.

Air Valves.

Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
C. A. Dunham Co., Ltd., Toronto.
Gurney Foundry Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Jenkins Bros., Ltd., Montreal.
Kerr Engine Works.
Steel & Radiation Co., Ltd., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Boilers, Steam or Hot Water.

Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Toronto.
Warden King Co., Ltd., Montreal.

Boiler Feed Regulators.

C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, Etc.

Canadian Wolverine Co., Ltd., Chatham.
Canadian Johns-Manville Co., Ltd., Toronto and Montreal.
Dunham, C. A., Toronto.
Empire Brass Mfg. Co., London.
James Morrison Brass Mfg. Co., Toronto.
Jenkins Bros., Ltd., Montreal.
H. Mueller Mfg. Co., Sarnia, Ont.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.

Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., Toronto.
Tallman Brass & Metal Co., Hamilton.
James Morrison Brass Mfg. Co., Toronto.

Cellar Drainers.

C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.

Closets.

Amherst Foundry Co., Amherst, N.S.
Empire Brass Mfg. Co., London.
Galt Brass Co., Galt.
B. O. T. Manufacturing Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Johns-Manville Co., Toronto.

Correspondence Schools.

Anglo-American Sanitary School.

Country Residence Equipments.

General Machinery Co., Ltd., Mulock Ave., Toronto.
National Equipment Co., Limited, Toronto.

Damper Regulators.

C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.

Empire Brass Mfg. Co., Ltd., London.
Fittings, Limited, Osbawa.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Ejectors, Steam.

James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.
Tallman Brass & Metal Co., Hamilton.

Ejectors for Sewage.

National Equipment Co., Toronto.

Enamelware.

Amherst Foundry Co., Ltd., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Ltd., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Ltd., Toronto.

Electric Pumping Machinery.

General Machinery Co., Ltd., Toronto.
National Equipment Co., Ltd., Wabash Avenue, Toronto.

Fittings.

Empire Brass Mfg. Co., London.
Fittings, Limited, Osbawa.
Steel & Radiation, Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Warden King, Ltd., Montreal.

Flushometers.

Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., Ltd., London, Ont.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Co., Ltd., Toronto.
Mueller Mfg. Co., Ltd., Sarnia, Ont.

Floor and Ceiling Plates.

Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
Canadian Wolverine Co., Ltd., Chatham.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Warden King, Ltd., Montreal.

Garbage Burners.

Gurney Foundry Co., Ltd., Toronto.

Gasoline Engines.

National Equipment Co., Ltd., Wabash Avenue, Toronto.

Gas Mantles.

Hamilton Gas Mantle Co., Ltd.

Gas Water Heaters.

Gurney Foundry Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Generators.

Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.

Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
The E. S. Manny Co., Montreal.
Warden King, Ltd., Montreal.

Lead.

Empire Brass Mfg. Co., London.
Hoyt Metal Co., Toronto.
Tallman Brass Mfg. Co., Hamilton.
James Morrison Brass Mfg. Co., Toronto.

Mixing Valves.

Geo. Carpenter, Montreal.

Nipples.

Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
C. M. Kemp Mfg. Co., Baltimore.
Empire Brass Mfg. Co., Ltd., London.
Fittings, Limited, Osbawa.
Galt Brass Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallacebnrg Brass Mfg. Co., Wallaceburg.
Warden King, Ltd., Montreal.

Oil Storage Systems.

National Equipment Co., Ltd., Wabash Avenue, Toronto.

Packing.

Canadian Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.

Pipe, Black and Galvanized.

Canadian Tube & Iron Co., Ltd., Montreal.
Steel & Radiation, Ltd., Toronto.
Warden, King, Ltd., Montreal.
Steel Co. of Canada, Montreal.
James Morrison Brass Mfg. Co., Toronto.

Pipe Joint Compounds.

Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.

Anthes Foundry Co., Toronto and Winnipeg.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.

Pipe Threading and Cutting Machinery.

Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.

Pipe and Radiator Hangers.

Beaton & Cadwell Mfg. Co., New Britain, Conn.

Porcelain Ware.

Amherst Foundry Co., Ltd., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope, Ont.
Standard Sanitary Mfg. Co., Ltd., Toronto.

Pumps.

C. A. Dunham & Co., Ltd., Toronto.
National Equipment Co., Toronto.
General Machinery Co., Ltd., Mulock Ave., Toronto.
Cluff Bros., Church St., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Radiators.

Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.

Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

Radiator Fittings.

Fittings, Limited, Osbawa.

Radiator Traps (Steam.)

C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.

C. A. Dunham & Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Sani-Flush.

Hygienic Products Co., Canton, Obio.

Septic Tank Valves.

Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
National Equipment Co., Ltd., Wabash Ave., Toronto.

Solder.

Hoyt Metal Co., Toronto.

Steam Specialties.

Dart Union Co., Ltd., Toronto.
G. A. Dunham & Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.
The E. S. Manny Co., Montreal.

Steam Traps.

Canadian Morehead Co., Ltd., Woodstock.
E. S. Manny Co., Montreal.

Smoke Test Machines.

James Morrison Brass Mfg. Co., Toronto.

Testing Plugs.

James Morrison Brass Mfg. Co., Toronto.
C. M. Kemp Mfg. Co., Baltimore.

Tools.

Armstrong Mfg. Co., Bridgeport, U.S.A.
Borden-Canadian Co., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tap & Die Co., Ltd.
Hall & Sons, Ltd., Brantford.
Nicholson File Co., Port Hope, Ontario.
James Morrison Brass Mfg. Co., Toronto.
William Johnson, Newark, New Jersey.
Williams, J. H., & Co., Brooklyn, N.Y.

Unions.

Dart Union Co., Ltd., Toronto.
Fittings, Limited, Osbawa.

Vapor Heating Systems.

C. A. Dunham Co., Ltd., Toronto.

Vitro Tanks.

Cluff Bros., Ltd., Church St., Toronto.
Cluff Manufacturing Co., Ltd., Toronto.
James Robertson Co., Ltd., Toronto.

Vacuum Systems of Heating.

C. A. Dunham & Co., Ltd., Toronto.

Water Supply Systems.

National Equipment Co., Ltd., Wabash Avenue, Toronto.
The General Machinery Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.

G.M.C. Water Systems

We are now furnishing our "G.M.C. Special" Automatic Electric System, as in cut, with our new Ball-Bearing Pump — Capacity 200 gal. per hour. It is operated by a one-quarter horse-power motor. The Pump itself will supply a sprinkler without the aid of the tank.

This System fulfills conditions which other manufacturers meet with a one-half or one horse-power pump. We save you first cost and cost of power for operation.

THE GENERAL MACHINERY CO., LTD., 22 Mulock St., TORONTO

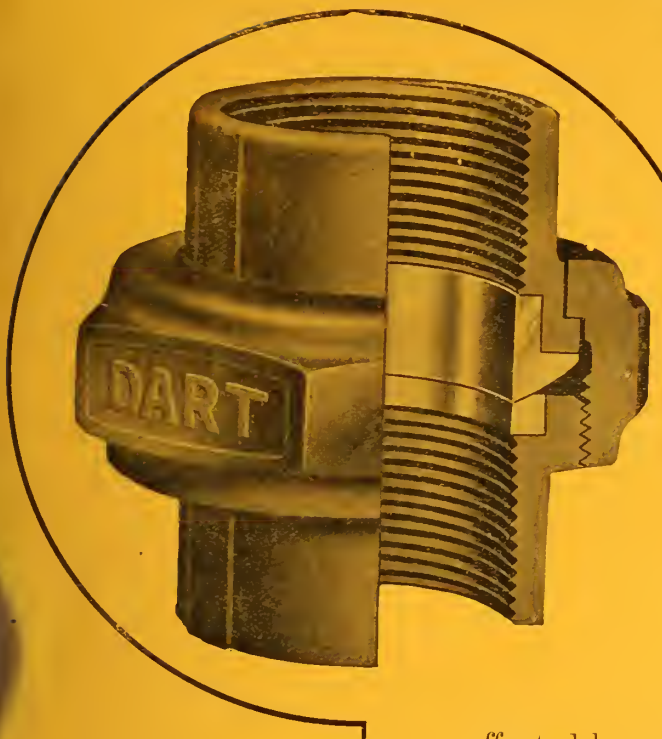
BOOKS FOR SANITARY ENGINEERS

Pertaining to Heating, Lighting, Plumbing and Ventilation. Sent Post Paid only on Receipt of Price

American Steam & Hot Water Heating Practice	$3 00
American Plumbing Practice	2 50
American Sanitary Plumbing. By J. J. Lawlor	2 00
Baldwin on Heating, or Hints to Steamfitters	2 50
Contract & Estimate Record Book for Plumbers. By B. H. Jessup	1 50
Contract & Estimate Record Book for Plumbers (Pocket Edition) By B. H. Jessup	50
Contract & Estimate Record Book for Steam & Hot Water Heating. By B. H. Jessup	1 50
External Plumbing Work. By J. W. Hart	3 00
Formulas & Tables for Heating. By J. H. Kinealy	1 00
Furnace Heating. By W. G. Snow	1 50
Guide to Testing Plumbing. By J. K. Allen	25
Hints to Plumbers on Joint Wiping, Pipe Bending & Lead Burning. By J. W. Hart	3 00
Heating & Ventilating Buildings. House Drainage and Sanitary Plumbing	50
House Heating by Steam & Hot Water. By C. B. Thompson	3 00
Hot Water Heating, Steam & Gas Fitting, Acetylene Gas — How Generated and How Used. By J. J. Lawlor and Geo. T. Hanthett	2 00
Hot Water Supply and Kitchen Boiler Connections. By William Hutton. Just published	1 65
Principles of Heating. By W. G. Snow	2 00
Principles & Practice of Plumbing. By J. J. Cosgrove	3 00
Principles of Hot Water Supply By J. W. Hart	3 00
Questions & Answers on the Practice & Theory of Sanitary Plumbing By R. M. Starbuck	1 00
Repair Kinks. By Martin L. Kaiser	50
Sanitary Engineering of Buildings. By W. P. Gerhard	5 00
Sanitary House Drainage; Its Principles & Practices. By T. E. Coleman	2 40
Sanitary Plumbing & Drainage. By J. W. Hart	3 00
Sanitation in Modern Home. By J. K. Allen	2 00
Sizes of Flow & Return Steam Mains	50
Steamfitters' Computation and Price Book. By Dean	3 00
Steam & Gasfitters' Text Book	5 00
Steam Heating for Buildings. By W. J. Baldwin	2 50
Steam Heating & Ventilation. By W. S. Monroe	2 00
Steam & Hot Waterfitters' Text Book. By Thos. E. McNeill	1 00
Lighting by Acetylene Gas, Electric Furnace Generators & Burners. By W. E. Gibbs, M. E.	1 50
Mechanical Drawing for Plumbers	1 50
Modern Plumbing, Illustrated. By R. M. Starbuck	4 00
Notes on Heating & Ventilation By J. R. Allen	2 00

TECHNICAL BOOK DEPARTMENT

MacLean Publishing Co., 143-149 University Ave., Toronto



"A job well done is satisfaction forever."

Dart Unions
will get you more pipe jobs

They are trade builders because the bronze faces, when drawn together, form a joint that never leaks or deteriorates, and therefore never bothers the customer.

Dart Unions will save you time and labor because the ball-shaped joint makes connecting easy whether pipes are in or out of line.

Note the heavy iron parts. They are not affected by expansion, contraction or vibration.

Dart Unions all have our trade-mark cast on them. See illustration. We replace **two** for **one** any Dart that is not right.

BRONZE TO BRONZE
at the Joint

Sold by Jobbers. **Manufactured by DART UNION CO., LTD., Toronto**

KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

This plant is at your service.
Help us keep it busy.

REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

Quickest possible deliveries. **Consistent Prices.** Best quality of goods. **Write for Catalog No. 5.**

The Kerr Engine Company, Limited Walkerville, Ontario
Valves and Hydrants Exclusively

YOUR CREED

You believe in Canada. You love her as your home. You honor her institutions. You rejoice in the abundance of her resources. You have unbounded confidence in the ability and enterprise of her people, and you cherish exalted ideas of her destiny among the nations of the world.

You are loyally supporting the *Military Forces* of Canada and the Empire. Will you also support the *Commercial Forces* of Canada by buying Goods that are

"Made in Canada"
By Canadians
For Canadians

?

We ask you to adopt the above as part of your creed when buying Brass Goods.

We ask your support because we know that no Brass Company outside of Canada or in Canada can sell you a better quality than the **"PERFECTO"** line made by

GALT BRASS COMPANY, LIMITED
GALT, CANADA

Trade-Mark
PERFECTO
Registered

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

VOL. IX. Publication Office: TORONTO, FEBRUARY 1, 1915 No. 3

Enameled All-over

VICTOR ONE-PIECE BATH

Enameled Inside

The "VICTOR BATH EXHIBITS" at our Showrooms continue to be one of the chief sources of interest and attraction to prospective purchasers. Scores of people have visited these Showrooms especially on this account and we have similar reports from other places where the **Victor Bath** is on display.

The convenience of its LOW HEIGHT, the attractive simplicity of its DESIGN and the beautiful white enameled FINISH INSIDE AND OUTSIDE—these features, in addition to its LOW SELLING PRICE, have made the **Victor Bath** a LEADER among leaders and insure an increasing future demand for this bath.

YOU WILL MAKE NO MISTAKE IF YOU GIVE A **Victor Bath** A PROMINENT PLACE IN YOUR SHOWROOM. IT IS ONE OF THE MOST POPULAR OF ALL HIGH-GRADE BATHS AND WILL ADD PRESTIGE AND "PULLING POWER" TO ANY SHOWROOM.

The Standard Ideal Company Limited

General Offices and Factories, Port Hope, Canada

TORONTO	MONTREAL	WINNIPEG	VANCOUVER
119 King St. East	42 Beaver Hall Hill	80 Lombard St.	410 Carter Cotton Bldg.

Beaver Brand
Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

AGENCIES:

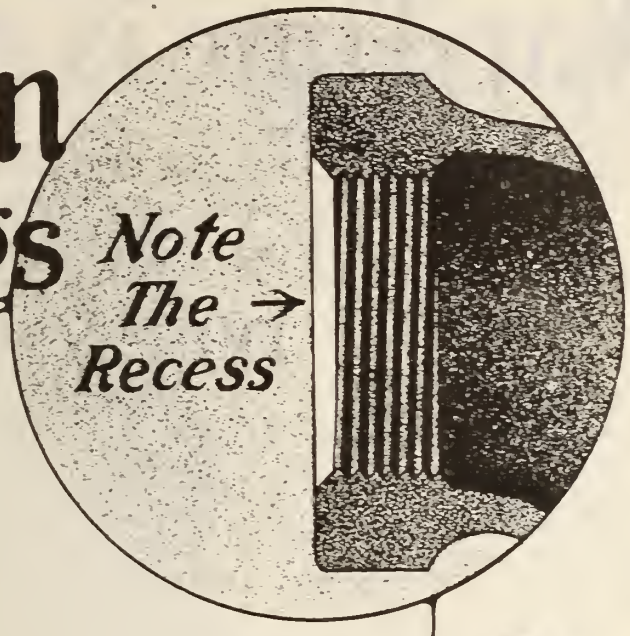
ONTARIO:
Monarch Brass Mfg. Co.,
178 Victoria St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes,
120 Lombard St., Winnipeg

BRITISH COLUMBIA:
A. O. Campbell,
864 Cambie St., Vancouver

FITTINGS ◆ LIMITED

Cast Iron Pipe Fittings



The use of our Cast Fittings ensures satisfaction as they are produced from a special semi-steel mixture and are designed for **strength, appearance** and **service.**

Trouble with burred threads and consequent lost time in starting the pipe is eliminated by the **recess.**

Our specially designed testing apparatus ensures alignment and gauge to an exactness.

Specify "Diamond Brand"

(Samples Upon Request)

MADE IN CANADA

BY

Fittings Limited

Oshawa

Montreal Winnipeg Vancouver

FITTINGS ◆ LIMITED

War Time is a Good Time

to look around and make **Comparisons** in the material

You Use (Pay US a Visit)

DON'T FORGET

The price on the INVOICE is ALL a B-O-T outfit will cost you, as we live up to our 5-year guarantee to the letter.

Look for the Trade-Mark

The B-O-T Manufacturing Company, Limited

B-O-T Building, 159-61 Richmond Street West, Toronto

Montreal Office:
68 Beaver Hall Hill

Vancouver Agents:
The Robertson-Godson Co.

Winnipeg Office:
J. H. Leonard
405 Tribune Building

TOLEDO AND JARDINE

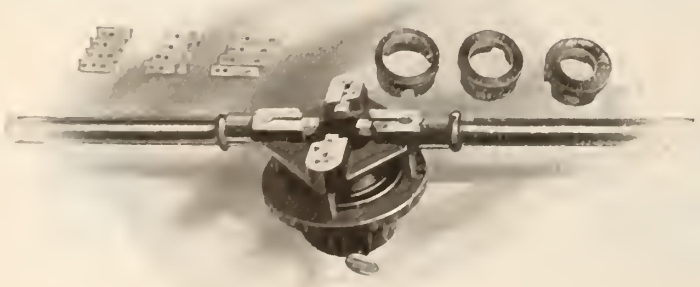
PIPE THREADING TOOLS

MADE IN CANADA

Your Jobber sells them

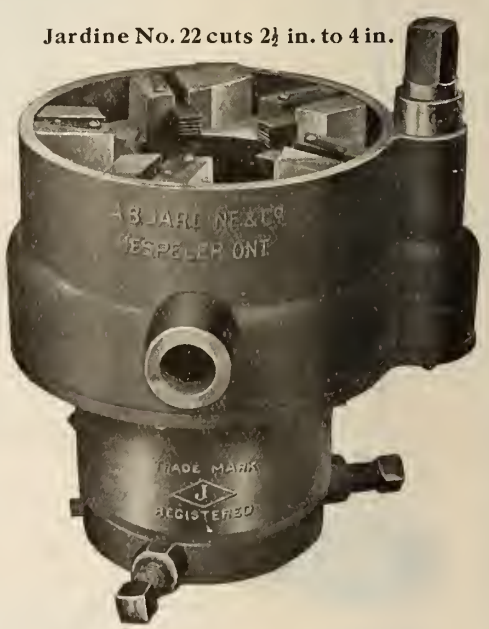
Perfect threads any size up to 12" finished at one cut by one man.

IT PAYS TO USE THE BEST TOOLS.



Toledo No. 1 cuts 1 in. to 2 in.

Jardine No. 22 cuts 2½ in. to 4 in.



Ask for our new Pipe Die Catalogue

A. B. JARDINE & CO.

Hespeler, Ontario

THE DAISY BOILER

Over 55,000 DAISY Boilers

are giving the best of service throughout Canada.

The Daisy has qualities which make it a better proposition than any other on the market.

Made in the best equipped plant in Canada.

Without doubt the most popular boiler made.

Every installation means another customer satisfied.

Minimum consumption of fuel.

Maximum amount of heat.

Rear view of two Daisy Boilers connected with twin headers. This system gives great satisfaction in mild and extreme weather.

WARDEN KING LIMITED, MONTREAL

BRANCH, 200 Adelaide St. West, TORONTO

AGENTS:

The CRANE & ORDWAY CO., WINNIPEG, MAN.
The MECHANICS' SUPPLY CO., Limited, QUEBEC, P.Q.
The JAMES ROBERTSON CO., Limited, ST. JOHN, N.B.
The WM. STAIRS, SON & MORROW, Limited, HALIFAX, N.S.

It Costs Less To Use More

It costs money to use up half-worn files. They should be replaced by new ones—preferably

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

MADE IN CANADA

Practical tests prove the inefficiency of a half-worn file. Prove that it is cheaper to use two new files than to wear out a half-worn file.

By using more of these famous files, you cut your filing cost to the bone. You save time—money—labour—and loss. You save enough not only to pay for the new files—but to make a substantial profit as well.

NICHOLSON FILE COMPANY
Dealers Everywhere
Port Hope Ontario

Have you read "File Philosophy"? You ought to. A copy and our catalog sent free on request.

Why I Use H-O Pipe Joint Cement

"Because it expands after I make up the joint, giving a much tighter joint than is possible with other cements.

"Because it makes a permanently tight joint and does not harden. After it has stood for years the joint can easily be broken without destroying the fitting.

"Because it comes in powder form and can be mixed with water or oil when needed. It costs the same per pound as ready-mixed cement, but quantity considered is four times cheaper. Saves 75 per cent. of pipe joint cement bills.

"Because it won't taint water, stain marble or tile, isn't poisonous and won't wash out of the pipes."

Write our nearest Branch for Sample and "H-O Pipe Joint Cement Booklet."

THE CANADIAN
H. W. JOHNS-MANVILLE CO., LIMITED
Manufacturers of Plumbing Fixtures; Closet Seats; Flush Valves; Washerless Faucets; Copper Floats; Pipe Coverings; Joint Runners; Packings; Etc.

TORONTO MONTREAL WINNIPEG VANCOUVER
2872

SOMETHING NEW

THE GEYSER AUTOMATIC WATER HEATER

is composed of a vertical cylinder from four to six feet long, according to size. The cylinder contains brass pipes which receive the steam and transmit heat to the water. These pipes are screwed to the base chamber, but remain independent from one another at the top, consequently, the expansion is entirely free, and leaks are impossible.

FULLY GUARANTEED
MANUFACTURED BY
THE E. S. MANNY CO.,
MONTREAL
R. E. Cleaton Co., 20 St. Nicholas Street, Montreal
Sales Agents

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND

THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal

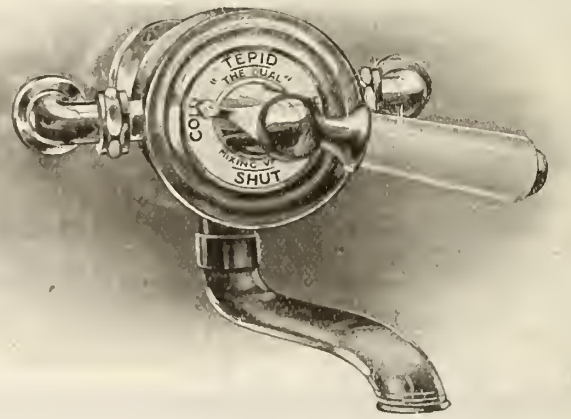
Messrs.
BRUNNER, MOND & Co., ENGLAND,
Have the finest Industrial Bath Installation in Europe.

OVER 2000 EMPLOYEES
are provided for.

This is the Valve used.

Made in England
by GUMMERS Ltd.,
ROTHERHAM

THE DUAL VALVE
IS THE FINEST MIXER YET PRODUCED



This Mixer is strong and well built.

It can be taken to pieces without disturbing connections. Made in various types for Baths, Lavatories, etc.; also special stock pattern with one or two outlets at option for making up sets.

Send for booklet to

Geo. Carpenter,
314 University St.,
Montreal
Canadian Agent

Talking to the Point—

CLASSIFIED ADS. get right down to the point at issue. If you want something, say so in a few well-chosen words. Readers like that sort of straight-from-the-shoulder-talk, and that is the reason why condensed ads. are so productive of the best kind of results.

CLASSIFIED ADS. are always noticed. They are read by wide-awake, intelligent dealers, who are on the lookout for favorable opportunities to fill their requirements.

TRY A CONDENSED AD. IN THIS PAPER.

Ashdown's Water Supply Systems.

CONVENIENT — DIAMOND A BRAND — ASHDOWN'S GUARANTEE — RELIABLE

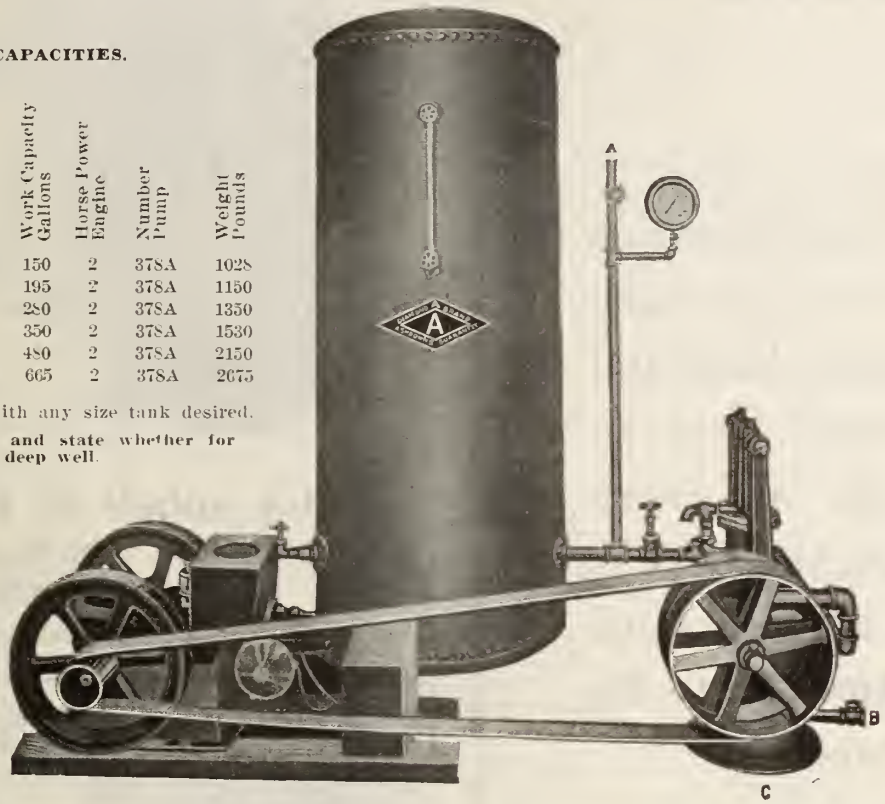
For Farm Use, Country Homes, Summer Resorts and Greenhouses. Power Operated.

SIZES AND CAPACITIES.

Outfit Number	Size Tank Inches by Feet	Capacity Gallons	Work Capacity Gallons	Horse Power Engine	Number Pump	Weight Pounds
JH 1410	30x6	220	150	2	378A	1028
JH 1411	30x8	295	195	2	378A	1150
JH 1412	36x8	420	280	2	378A	1350
JH 1413	36x10	525	350	2	378A	1530
JH 1414	42x10	720	480	2	378A	2150
JH 1415	42x14	1000	665	2	378A	2675

Outfit may be furnished with any size tank desired.

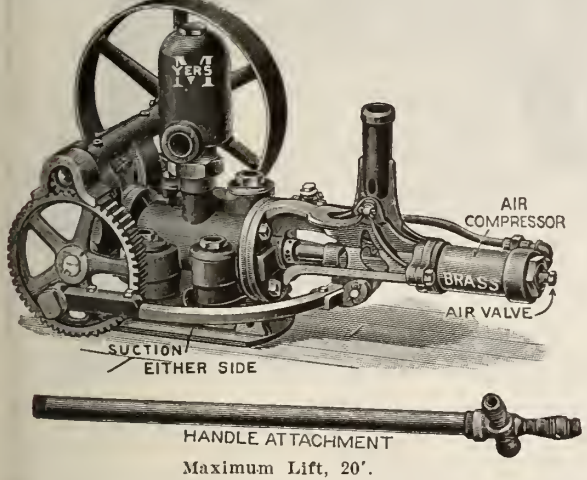
Order by outfit number and state whether for shallow or deep well.



A—Supply to House. B—Suction for Shallow Wells. C—Suction to Deep Well.

The above Outfit is for supplying Water from Shallow or Deep Wells, where Belt Power is available.

The complete system includes Hydro-Pneumatic Tank, Hydro-Pneumatic Power Pump, Gasoline Engine, Water and Pressure Gauges, Fittings, Shut-off and Drain Cocks, Relief and Check Valves and Belt. (Pipe not included.)



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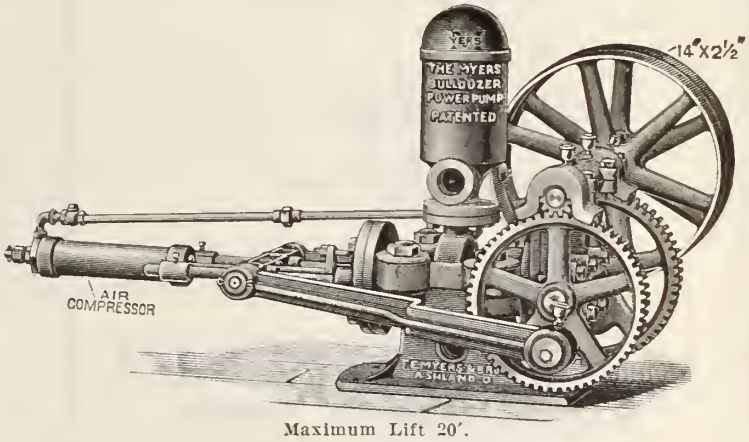

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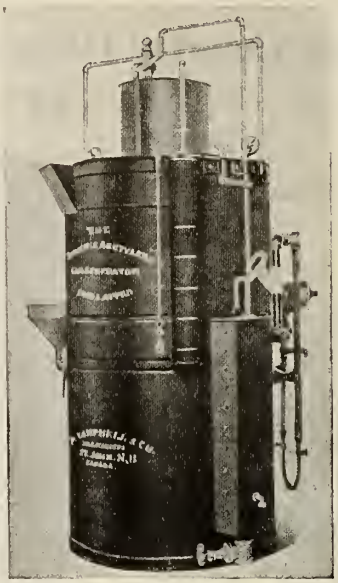

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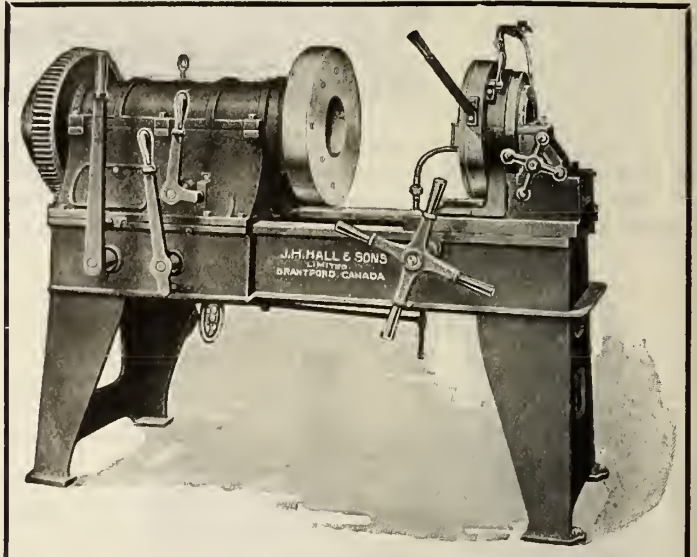

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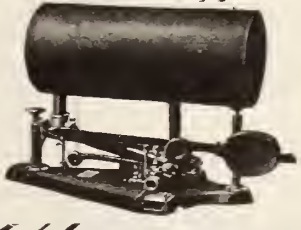

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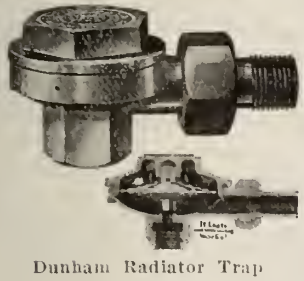

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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, FEBRUARY 1, 1915 No. 3

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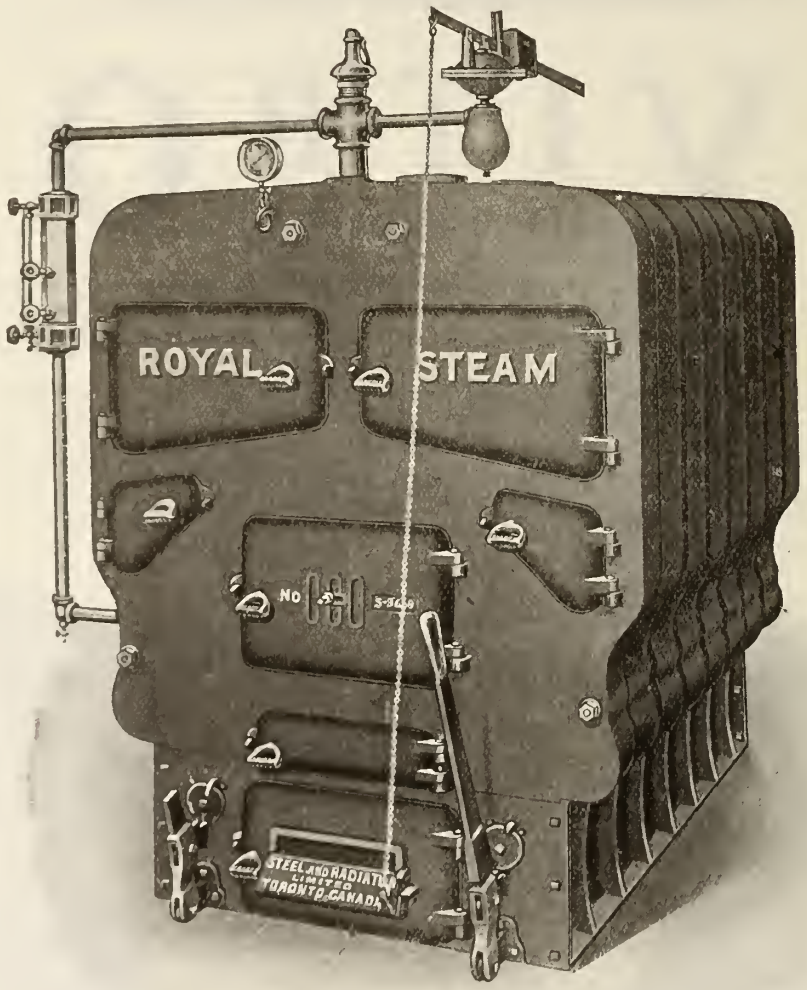

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THE SANITARY ENGINEER

VOL. IX. FEBRUARY 1, 1915. No. 3

Consider the Fire Insurance Question

The Necessity for Careful Study of the Policy—The Company, Insurance Clause—Difficulties With Regard to Settlement—The Need for the Adjuster — Some Special Clauses.

YOU can take a horse to the water, but you can't make him drink. You can talk adequate fire insurance to some businessmen until you are blue in the face, but you can't make them insure—not even if you are an insurance agent! There is no doubt that while fire insurance is pretty general it is still not universal, and it is very often most inadequate. There is altogether too much complacency about the matter. Many men go into relations with fire insurance companies like a bull goes for a five-barred gate. Sometimes the bull doesn't do anything but damage himself.

Financial men have been dinning it into our ears for many moons that Canada has an abnormal annual fire loss. The figures are astonishing. It has been stated by experts that they are higher in proportion than those of any other country. The fault is easy of discovery. Everybody blames his neighbor. It never occurs to him to blame himself. The majority of men take out a fire ininsurance policy and so long as they pay their premiums they sit tight and think they have done their duty. The idea that fire may visit their own particular store never occurs to them.

It is not the purpose of this article to deal with the sanitary engineer in his relation to the fire insurance company as a bird easy of plucking by a successful plucker. That fire insurance men are crooks is as ridiculous a supposition as it is unfair. But there are good and bad in every trade. To say that fire insurance men are all saints is just as foolish as to say they are all sinners. Nevertheless, there are those companies operating, from whom the sanitary engineer will be wise to keep away. There are tricksters that the sanitary engineer can't beat, no matter how he tries. Prevention is better than cure. With the best of companies the wise man will use all possible caution. And, indeed, the more cautious the man is the better pleased will be the company if it is a good one.

Study Your Policy.

The prime factor in getting a square deal over your fire insurance is to know your policy. It is a contract, by virtue of which the company agrees to pay a certain sum of money in case of fire, **providing that the conditions of the contract have been fully adhered to by the assured.** This means something more than mere prompt premium payments. Insurance men—like sanitary engineers—are not in business for their health. If they find themselves called upon to pay out a sum of money because of fire their

Some men get their policy and are too busy to bother reading it. Later —they wish they had done so.

first impulse is to see how small that sum can be made. It is human nature, as well as insurance nature.

The man who is going to take out an assurance policy should, first of all, be sure of the standing of the company which he has in mind. Some companies have lower rates than others. Usually this means that the protecting power of the company is not so good. Since the first objective of fire insurance so far as the insured is concerned is protection, he needs to be sure that his risk is covered by a good company. Get the agent to tell you the financial standing or, better still, show you the balance sheets of the company for whom he is acting. Be sure you are with a company which is strong financially. It may mean thousands of dollars to you.

It is most important that the man who insures should understand his policy. If you were going to buy a house you would peruse the deed to see if all was in order. Yet comparatively few men bother to do this in the case of an insurance policy.

All Policies Identical.

The sanitary engineer who is insured in more than one company should see to it that the conditions and particulars and descriptions should be identical in every policy. This has two advantages. First, if you should have a fire it will save a good deal of haggling and misunderstanding between the companies. Secondly, it will prevent any company from giving you a contract so worded that it is useful to the company itself, should anything happen. For instance, a clause that some companies are fond of inserting is to the effect that where additional insurance is carried the company should be bound by the policy most favorable to it, not necessarily its own policy. This obviously is a very good "way out" for the company.

Then, see to it that your policy has this clause, "Further insurance permitted," so that you are at liberty to insure when and with whom you will, in case of necessity, for additional insurance.

That Co-Insurance Clause.

A particular which very often results in disaster for a merchant is the insertion of the 80 per cent. co-insurance clause. Too much care cannot be taken by a person who wants fire insurance before he adopts this form. This is a contract by which the insured agrees to keep insured to the extent of at least 80 per cent. of the value of the property. If he fails to do so he himself must stand for any loss which would have been paid by the insurance he should

have carried in excess of that which he actually did carry.

For example, if a sanitary engineer has a thousand dollars' worth of stock and insures it subject to this eighty per cent. clause, he is complying with the conditions. Later in the year his stock increases to $1,500, but somehow neglects—perhaps only for a day or two—to increase his insurance. Then the fire comes along. The loss and damage amount to $600. The insured, under the co-insurance clause, should have had insurance to the extent of eighty per cent. of $1,500, or $1,200 worth. Instead of that, he has only eighty per cent. of his original $1,000, which is $800. The insurance company, therefore, only pays eight-twelfths of the loss of $600, equaling $400. And the owner must stand the loss of the other four-twelfths of the $600 loss, which is $200, himself.

I hear from insurance experts that careful examination into the losses in which the co-insurance law applies justifies the statement that it is most unwise for the small man to have the co-insurance clause included in his policy. Keep away from it. Remember the words "co-insurance," and avoid them as you would thin ice. They are thin ice. Put them up as a bogey, and leave them there. Sometimes they are a help, but only rarely. The risk is too great. The owner may only be delayed a day or two in getting extra insurance to meet that clause, and yet the fire may happen in that time. It is much better to have straight insurance and pay a little higher rate for it than pick up "co-insurance" from the bargain-counter only to find later that it was far more expensive in the ultimate casting-up of things.

Obviously the eighty per cent. co-insurance clause is a splendid thing if your property never burns up. In return for such a clause the insurance company makes the concession of a lower rate, so that the man who has the co-insurance clause is able to reflect that he is getting cheaper insurance than his neighbor who has not the co-insurance clause. But if he is getting cheaper insurance he is not getting the same protective power, as has been shown.

The insurance companies have two good lines of defence because of this clause. They can try to prove that the amount of the damage is less than the amount claimed by the assured; secondly, they can seek to prove that the value of the property before the fire was more than the assured had figured it, and hence—as we showed by an example above — that the latter was not insured for 80 per cent., and so did not comply.

Furthermore, not one insurance agent in twenty, nor one sanitary engineer in more than that, understands the co-insurance clause, and the wise man doesn't dabble in things he doesn't understand.

Stock and Property Separate.

Many men think that their insurance policy covers their property, stock and everything they have. Most companies insure stock separate from the property, such as fixtures and so forth. The assured should be careful to see that his policy or policies cover all his belongings. The co-insurance clause, for instance, treats each item separately. When the retailer describes his stock he should not say "stock consisting of," but "stock of merchandise consisting principally of," and in this clause should be included "supplies used in packing, shipping and delivering." No loop-hole should be left. Some insurance companies are adepts for discovering them for themselves, anyway.

Get Hold of An Expert.

When trouble comes along it is natural for us to go to someone who can help. When you are ill you go to a doctor. If you have a fire, go to an insurance expert, an adjuster. This is a point which should be noted. In case of

So says Mr. Merchant when the fire has come along, and he finds that he wasn't totally covered.

a fire it is a certainty that the insurance company concerned will hire adjusters, and at such a time an adjuster for the assured is a necessity. The inexpert sanitary engineer cannot hope to win out against a professional insurance man, and he will lose if he tries. It is worth while paying an adjuster his fee. That fee will probably be stiff, because adjusting is an expert's game, but it will be money well spent, for with the adjuster's help you will at least know that the information you give the insurance people will not be used against you. Don't try to do your own fighting with the company, if there is going to be a fight. Pay the adjuster to do the fighting. He is an old hand at the game, and he knows how to get under and over the adversary's guard.

"Specials" for Sanitary Engineers

So far this article might have applied with equal suitability to any retailer, almost. There are, however, certain points of special importance for the sanitary engineer to remember.

(1) If a dealer keeps coal oil or lubricating oil for sale in any quantity exceeding five gallons, a special permit must be endorsed on that policy.

(2) Any quantity of gasoline and benzine kept on the premises must be so set forth in the policy.

(3) If any of the store furnishings such as cash register and so forth are held under lien or sale agreement, the policy must read "in the event of the property hereinbefore mentioned being held under royalty, lien, or sale agreement, this insurance shall be held to cover the vendor and vendee."

(4) The question of the dealer's title to the property or stock should be looked after. A clause should be included which will read, with regard to the property, "owned or held in trust," or "on consignment," or "sold but not delivered," or "for which he is not responsible," or "held under lien, sale or royalty agreements," according, of course, to the particular case.

RAILROAD BUYING STARTED.

Cleveland, Ohio, Jan. 7.—The extent of the slump in manufacturing which took place last year is indicated by the figures of pig iron output, which was 22,970,926 tons in 1914, compared with 30,652,767 tons in 1913, which had held the record, although 1913 was not a satisfactory year in business. The production for December was 1,495,325 tons, a loss of 5,944 tons compared with November. The average daily production for December was 48,236 tons, a loss of 1,806 tons compared with November.

The encouraging fact, however, is that railroad buying has started in a moderate way and that there are many indications that fair business will be booked during the first quarter. The Steel Corporation which was operating at only 28 per cent. of its capacity at the close of the year is now operating at 40 per cent.—Iron Trade Review.

APPOINT NEW TRAVELLER.

Lochlin Ross, of the warehouse staff of H. S. Howland, Sons & Co., has been appointed traveller to cover the ground from Sudbury to Ft. William formerly covered by the late Donald Roy.

Analysis of Canadian Sanitary By-laws

Commenting Upon the By-law Known as By-law No. 528, Governing Sanitary Engineers and Sanitary Engineering Construction in the Town of Waterloo, Ont.

(Continued from last issue.)

CONTINUING these comments we will now deal with the following clauses.

Clause 49.—Sinks in all hotels, restaurants, boarding houses, laundries or other places where the inspector may direct, shall be provided with suitable grease traps.

This clause is of a very practical nature and is to be commended. Any person who has had years of practical experience would endorse such a clause, which in many cases is not included in the by-laws.

Clause 48.—Overflow pipes from fixtures must in each case be connected on the inlet side of the trap.

This clause is rather of a general nature. It is in order and necessary, though it is seldom that fixtures are fitted up without patent waste overflows.

* * *

RAIN WATER LEADERS.

Clause 50 — Rainwater leaders must in no case be connected with sewers.

This clause is all right so far as it goes, but it is not quite complete. While it forbids connecting rainwater leaders to the sewers it does not say where they shall be connected. Such a clause leads one to infer that there is a system of storm drains with which to connect all rainwater leaders. Of course, these leaders must be connected with something.

Clause 51.—Where a soil pipe passes through a cellar basement, it shall be properly supported by brackets along the side walls or by hooks or stirrups from the floor beams.

Such a clause as the above is very necessary. There are quite a few persons who do not credit the importance of properly hanging soil pipes in the position named. The only criticism we have upon this clause is that it should read, "or by iron hooks or stirrups made from iron one inch by one-quarter of an inch thick, and securely fastened to either the beams or joists.'

* * *

CONNECTING OLD WORK.

Clause 52. — Where plumbing works have been completed before this by-law comes into force, or if plumbing has been done in accordance with this by-law, permits will be granted for making connections with the sewer as in new work. But in case the plumbing is not in accordance with this by-law, such alterations shall be made as the inspector shall direct.

One feature about this clause is its clearness. There is nothing harsh about it, and it goes to show that all old installations must be brought right up to date. There are scores of towns which do not make this demand and the result is that one-half the plumbing work is old and insanitary. There is no reason why plumbing should not be all brought up to date these days. Why should a person building a new residence be forced to instal an expensive system of sanitary engineering, when at the same time others are allowed to continue using an insanitary system?

Clause 53.—Hoppers of approved design and location for the discharge of household and other liquid refuse will be permitted in yards, carriage houses, factories, etc., etc. All storm water must be excluded. The outlet to the hopper shall be through an iron grating permanently secured to the cast iron outlet pipe which shall not be less than two inches in diameter. The iron outlet pipe shall be vertical from the grating of the hopper to the iron trap of the same diameter as the outlet pipe, arranged so that it cannot frozen. The horizontal sewer leading from the trap shall be of iron or glazed sewer pipe four or six inches in diameter, as the town engineer may direct.

Clause 53 is one which could be a little clearer, and if plans were shown giving details, this clause no doubt would be very commendable.

Clause 54. — If any fixtures or pipes are inaccessible, the owner or his agent shall make such pipes and fixtures accessible within five days after notice has been given by the inspector to do so, and shall so leave them for inspection, which inspection shall be made within twenty-four hours after notice to the inspector.

* * *

PENALTIES.

Clause 55.—Any person or persons guilty of any breach of any of the provisions of this by-law shall, upon conviction before any Justice of the Peace having jurisdiction in that behalf, forfeit and pay a fine and penalty of not less than one dollar and not more than fifty dollars, exclusive of costs, such fine and costs to be collected by distress and sale of the goods and chattels of the offender, and in case of non-payment of any such fine and costs (if any) and there being no distress found out of which such fine and costs can be levied, it shall be lawful for the convicting Justice to commit such offender to the common jail of the County of Waterloo, with or without hard labor, for any period of time, not exceeding twenty days, unless such fine and costs (if any) including the costs of the distress and of the committal and conveyance of the offender to the said jail are sooner paid.

By-law No. 429 is hereby repealed.

Passed this Ninth Day of July, 1914.

(Signed) John R. Kaufman,
Mayor.

(Signed) James C. Haight
Clerk.

(Concluded.)

A SPLENDID MOVE.

The members of the Board of Health, Toronto, come in for a knock or two now and then. When, therefore, they do engage in some responsible undertaking worthy of mention, due credit should be given them. There are no less than 25 sanitary installations to be supplied to property owners who find they cannot finance the necessary improvements. The property will be assessed until the total value of each installation has been fully paid for, including interest. At this particular period such an announcement is very interesting. There are no doubt a lot of journeymen out of work just now, and any such work will be very much appreciated by the trade in general.

If every town or city would take the matter up seriously and finance such necessary work, there would be quite a lot more work in the plumbing trade than there is.

Why Many Fail in Business

What Starting in the Sanitary and Heating Business Should Mean — Certain Responsibilities Are Entailed in the Undertaking — Salary is an Overhead Expense if Owner is Actively Engaged in the Business.

IN the article in our last issue under the above heading, we mentioned that, with an overhead expenditure of $1,500 annually, estimates should be charged for. The evil of giving estimates free cannot be too strongly condemned. It is the main reason why so many fail in business and we will show why.

First of all, we presume that the man starting in business is a first-class mechanic and is thoroughly qualified to tender on the proposed work. In that case a tender is of some value. To whom? Why, to the person wishing to have the work done, of course. The very fact that a tender is of value proves that a charge should be made. If the time spent upon the plans and specifications had been spent repairing a boiler or fitting up a lavatory, there would be some cash return, in spite of the fact that the latter work would not require anything like as expert skill as that of preparing an estimate. We could cite several cases in point, and several of our readers have informed us that they have ceased to give out estimates free. Many will not give an estimate under any circumstances and are to-day, in spite of the war, actually making more money than they were doing a few years ago, even though they were doing in many cases twice the amount of work. Here is the matter in plain language—the journeyman hangs out his shingle, he has a good kit of tools, and possibly he is able to buy $1,000 worth of goods, which he does; he gets a contract to instal sanitary and heating appliances, and everything goes along merrily for a few months, when suddenly he is asked to pay a certain account for goods. He begins to wonder where the money has gone, as he has only taken so and so out of the business and has worked twice as hard and at least one-third longer hours than he would have done on day labor for a boss. Yes, he is short of money. The fact is, every hour has not counted for a cash return, whereas his overhead expenditure has been keeping the pace.

Very likely he has paid for stationery, telephone, books, postage, insurance, etc., all of which will not bring back any cash returns. He has probably estimated upon several jobs which he has not been awarded, and does not figure that the time spent on these estimates has cost money. We have taken this question up with the employer of a few men as well as those employing upwards of 100 men at one time, and the cry is this: "If we were paid for time spent upon estimating we could make a fair profit." One of our readers employing about eight men stated some time ago that the estimates he had submitted upon work which he had not been awarded had cost him over $1,000 in one year. Just imagine, such a sum would pay 5 per cent. interest upon a $20,000 investment. Speaking to four of the largest heating engineers in Canada, we were told that their estimating departments in the aggregate cost approximately $32,000 a year. There is no reason in the world why the public should be catered to in that way, and the sooner the practice is discontinued the sooner will sanitary and heating engineers come into their just rights.

A sanitary engineer with $1,500 annual overhead expenditure must buy $6,000 worth of labor and material and sell it for $7,500 plus whatever profit he wishes to make, and if he wishes to make 10 per cent. he will require to do $8,250 worth of business. If he has $1,000 cash invested in the business, or buys on credit to the amount of $1,000 he must add bank rate interest to the sum of $8,250 and presuming the bank or his creditor charges 7 per cent., that would increase the amount of business he must turn over to $8,320. If such a person spends 20 per cent. of his time giving out estimates free he will lose $1,650 a year in his business.

HONESTY WITH TIME.

By O. G. Bennett in Business.

We are all familiar with a certain class of employees, who, while they are honest with respect to cash transactions, sort of cut the corners in giving time to their employers. These people are often the ones who complain of lack of opportunity, and of the "pull" which some other fellow has, which, according to their idea, secures promotion and favor.

While there is, perhaps, a vast difference between taking an employer's cash and not delivering the full number of hours for which he pays, there would seem to be quite a direct relationship between the two, and if one is dishonest the other evidently leans considerably that way.

Let us suppose that you are a clerk and that your employer pays you eighteen dollars per week of fifty hours. If you arrive at your place of business half an hour late in the morning, take an extra half hour at noon, and "kill" one hour during the day, you would waste twelve hours of your employer's time during the week. By receiving your full number of hours your employer would pay thirty-six cents an hour for your work, but if you have delivered only thirty-eight hours the work would cost him over forty-seven cents an hour.

There are a great many who feel that as long as they "get their work out" they have done well all that is required of them, but would not promotion be liable to come more speedily if, after their regular duties are performed, they would devote the rest of the time for which they are paid to endeavoring to find some way in which they might improve methods, increase the profits or decrease expenses of their employer?

A large number of employees who are required to put in considerable overtime, with no extra compensation except possibly "supper money," feel rather justified in cutting down their actual number of working hours whenever possible, but if they are paid during absence on account of illness, during vacations, days off, etc., their argument is hardly a fair one, and by giving their full time and a little more occasionally when necessary they are simply playing the game of "Give and Take."

Remember that your employer pays for ability and service, and if your measure of service more than fills his expectations you will be marked for promotion. Make your employer's interests yours, and do for him as you might reasonably expect your employees to do for you were you running a business of your own.

Montreal Plumber Badly Burned.

Joseph Marquette, a plumber, had a gasoline torch explode in his hand recently while at work in a garage at the corner of Iberville street and Mount Royal avenue. He sustained horrible burns on the hands and arms. Marquette, whose home is at 1255 Rachel street, was taken to the Royal Victoria Hospital.

Collecting Accounts

Collection of Accounts a Problem of no Small Importance—More Attention Should be Paid to This Department—Sanitary and Heating Engineers as a Rule are Poor Account Collectors.

By JAMES NEWINGTON.

THE question of account collecting and credits has always been one of the most important problems which sanitary and heating engineers have had to cope with. As a whole, I believe there is no poorer collector in the world than the average sanitary and heating engineer. Somehow, the last thing he wants to do seems to be to get out account collecting. I have known many employers in my time who would never think of rendering an account until they were absolutely in need of the money to pay some draft which had to be met.

Then again, take the question of the granting of credits. No other businessman has the same features to contend with as has the sanitary engineer with reference to giving credit. For instance, a phone bell rings and some one is in trouble, say a range boiler is leaking. The employer sends a man down to repair the leak as he thinks, judging from what he heard on the phone. The man gets to the job and finds that it is necessary to instal a new boiler. He telephones to the shop for one and begins to take the old one out. By that time his boss is not in the office, so the boiler is installed and all completed. Then, possibly the account is not rendered for a month, or at the soonest at the end of the month. It is not paid and drags on another month, and finally it turns out that the party owing the account is a regular dead-beat. Next there is a kick about the bill and so on. In my experience of many years I have found that it pays most sanitary engineers to engage a good accountant to keep his books in order, and to see that every account, however small, is rendered as soon as the work is completed. Make him responsible for every account. This enables him to act upon his own initiative, and establish a system of his own regardless of acquaintances or friends.

I well remember a certain sanitary engineer who had built up a very creditable reputation for doing good work. He was a hustler, too, and on the whole seemed to be making money. He started in a very small way, and it was not very long before he had ten men working for him. However, I noticed one afternoon that he wore a worried look and being on speaking terms, remarked that he was looking out of sorts. "Yes, I am out of sorts," said he. "Do you know, Newington, I've been doing fine up till now but somehow I can't get my money in. I had a row with the bookkeeper yesterday because of the poor showing he made at account collecting and possibly said more than I should have done. This morning I found he had not turned up, so I left the messenger boy in charge of the office, chiefly to answer the phone, and went out to collect some money. I couldn't eat my dinner, I was so disgusted. Out of over $8,000 I got about $50. I simply can't do any collecting. I've just thrown the accounts on the desk and told the boy to phone up the bookkeeper to drop in this evening."

That evening I made it my business to drop in upon my friend the sanitary engineer and there were he and the bookkeeper having it out together. It transpired that the bookkeeper was also a fairly smart mechanic, could tender on a job, and knew the practical part of the business.

Leaves the messenger boy in charge of the office after a fruitless morning spent trying to collect accounts.

I advised them both to call in an accountant, which was done. He was also a collector and took hold of matters. It was found that 25 per cent. of the accounts were not worth the collecting. Yet, in spite of that loss, a new system was inaugurated, and accounts are rendered as soon as the work is done. Every day is collection day. An account is rendered and if there is no response in 48 hours there is a personal call made. If the call does not result in a settlement, there is some understanding arrived at, and a promise made when the account will be paid. This routine is kept up every day in the year, but it took over a year to put things on a sound basis.

The very first thing was to take an inventory of the stock, which showed that matters were not too bad. A financial statement was arrived at, and by a little financing the business was kept going. The bookkeeper is in sole charge of the cash end of the business and no

(Continued on Page 21.)

The Principle of Elbow Pattern Developing

A Complete Course, Treating in a Simple Way, the Art of Elbow Pattern Developing. Specially Written for Those Who Have Only Received a Limited Geometrical Education.

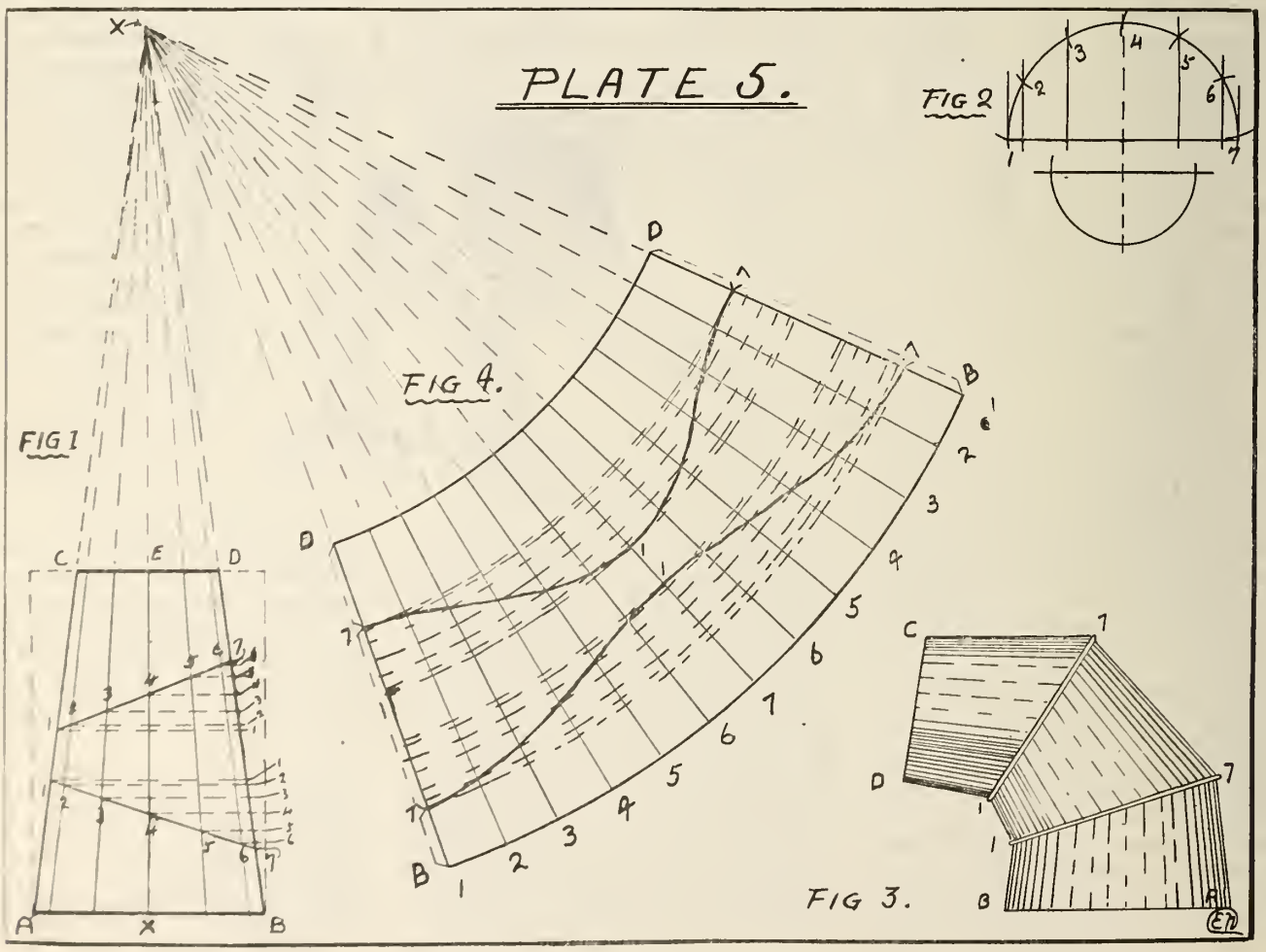
By EDWIN NEWSOME

THE first four articles of this series dealt only with the developing of patterns for what is known as straight elbows, or rather elbows with varying numbers of pieces, all of which were the same diameter at both ends. In this article we will take up the development of patterns for a taper elbow, each piece having its own proportion of taper.

Fig. 1 shows cone from which this style of elbow may be developed. Fig. 2 is half plan. First of all the size of the large end must be determined as well as that of the small end. Draw the base line A B shown in Fig. 1 and erect vertical line from X on base line upward. Let X be the centre of A and B, which is the diameter of large end of elbow, then place compasses at point E and mark off the diameter of small end. Next connect C and A and D and B by erecting two lines upward until they intersect the centre line X X. Having done so next determine the number of pieces that are necessary to make the elbow. This pattern which we propose to develop as for a three-piece elbow, must be divided up as shown, and in the following manner: Mark off the bevel from 7 to 1 on the large end, next draw a line parallel to the base line A. B., then determine the length of the small piece as shown from D. to 7. To be sure of having the top of the elbow set 90 degrees with large end when made, place the point of compass at 7 on lower piece and open up to 1. Then transfer this measurement from 7 to 1 on upper piece as shown. Next draw another parallel line from point 1 on the left of cone, this will give the proper bevel for all three pieces. Now examine Fig. 2. This is a half-plan of the large end of elbow, or shall we say, the half diameter. Divide this half circle into 6 equal parts and draw base line A, then erect lines from base line A so as to intersect the circle at 1, 2, 3, 4, 5, 6, 7. Next transfer these measurements 1 to 7 from base line A, Fig. 2 to base line A. B., Fig. 1.

The next step will be to divide off the cone, take a straight edge and erect lines from X at top of cone to the base line A. B. cutting C. D. which is the small end of the elbow and each of the two slant lines.

Then take the square and extend dotted lines from points 1, 2, 3, 4, 5, 6, 7 on slant lines to line D. B. From the points marked with small figures, 1, 2, 3, etc., which are at points of the side of cone, draw arc to correspond with those shown in Fig. 4, commencing first by making arcs D. D. and B. B. and connecting same as shown at B1. B1. Next transfer the measurements from Fig. 2 to arc B. B., Fig. 4, and erect lines from X to B. 1, 2, 3, etc., as shown in Fig. 4. This will give the stretchout measurements required. Having drawn all the arcs in Fig. 4, we will give the pattern the final finish. This must be done by marking from D. 7 to D. 7, and B. 7 to B. 7, as shown by the heavy lines. Next allow sufficient for seams and the pattern for a 3-piece taper elbow is completed, which will make an elbow as shown in perspective drawing. Fig. 3. (Continued in next issue.)



Getting After New Business

Showing How One of Our Readers in the Province of New Brunswick Gets After Business in the Rural Districts—In Our Next Issue We Will Show How an Ontario Reader is Cultivating This Kind of Business.

WE have from time to time been urging our readers to spread out, to get after new business. The war, as everyone knows, has put a check upon speculative building. Permits for new buildings of every class are decreasing every month, therefore those sanitary and heating engineers who have establishments in towns and cities will, if they wish to keep up with progress, require to spread out and look farther afield for new work.

This series of articles will be based upon letters which we have and are receiving from several of our readers in reply to our inquiries as to how they cultivate this class of business. The following is from one of our New Brunswick readers:

N.B., Jan. 20, 1915.

Editor The Sanitary Engineer:

Your favor of the 6th inst. has remained unanswered to this date owing to the rush of keeping up with Jack Frost, and also owing to our being in the midst of stock-taking.

Now, however, we are all through and we find that the past year has been very favorable to us. We start the new year in good spirits, and with a firm hope that we will be able to show an improvement on the last.

We fit up all kinds of heating, warm air heating being a specialty with us. We did at one time install from 20 to 30 furnaces a year under competition, but now we never attempt to compete with all-comers.

We make up our own specifications, submit our plans and guarantee our work, and the apparatus we install, and we allow no changes to be made without limiting the guarantee.

At first we found this to be an uphill fight, but now we are getting a better class of business, more profit and less competition.

Now, Mr. Editor, you asked us how we get after the country trade. We told you some time ago that we were installing quite a nice quantity of pneumatic water systems.

I personally watch the pages of the trade papers for anything new and if it appeals to me I get it and become thoroughly acquainted with it. Then I write for circulars from the manufacturers and mail them to my prospective customers.

You may ask how I learn of the customers? Well, in this way. In the early spring I take a run out to some country village and put up at either the town hotel or farm house. I let them know who I am and what my business is, tell the folks I meet that I am or have done work for Mr. so and so, and bring up the subject of plumbing on the farm, etc. It is not long before it is voiced through the village that Mr. ———, the sanitary and heating engineer of such a place is in the village, and often I get calls from the farmers on market days. I show them the goods and take care to explain fully their working. In this way I get them interested, then I put them on my mailing list and send them such descriptive matter as I know they are most interested in. I do this in a quiet way and never let my competitors know what I'm doing or where I'm going. I simply mind my own business.

I find that the methods I adopt are simple, yet require a little thought.

I don't suppose that you will care to publish this letter, because I know it must be all old news to you, as I learned it all from your trade paper. Wishing you and The Sanitary Engineer a prosperous year for 1915.

Yours sincerely,
A New Brunswick Reader.

Those who read the above letter very carefully will find a lot of good food for thought. The first part of the letter states that business is not too bad, and that a better year's business is expected during 1915 than was experienced during 1914. Our correspondent evidently is like the great writer who did not believe in that old saw, "Everything comes to him who waits." He substitutes for it the motto that "Everything comes to him who goes after it," if his heart is in the "going." There never was a man yet who, if he wanted a job could not get one, providing he wanted the job bad enough, and put heart and soul in the going after it.

No one can deny the fact that as a whole sanitary and heating engineers are poor business canvassers, not because of their inability to canvass but rather because of the fact that their services are sought after just when required.

The next feature in our correspondent's letter is, that he reads the Sanitary Engineer, and finds what has proved to him to be valuable information. Then he follows up what he reads in a practical manner.

Competing with all-comers is the kind of competition which leads to ruin, but we find that our friend has learnt the lesson and has cut it out.

Submitting one's own plans and specifications and price in accordance with them is a step in the right direction and particularly when a gilt-edge guarantee accompanies such plans and specifications. Here is a firm foundation upon which to build a good reputation and sanitary and heating engineers will do well if they demand that they submit specifications and plans themselves.

Not long ago the writer inspected several heating plants which were not giving satisfaction. It was found that the architect had drawn up the plans and specifications, and that they had been rigidly adhered to, but in every case either the furnaces were too small or there was not sufficient radiation installed.

(Continued in Next Issue.)

COLLECTING ACCOUNTS.

(Continued from Page 19.)

amount of friendship is allowed to interfere between the employer and bookkeeper. Not only that, but if a man phones in for goods the bookkeeper is right there to see who is going to pay the account, and when. From what I know of the sanitary and heating business I am sure by far the best system of collecting accounts is to engage some responsible person to do the work.

The Sanitary Engineer

Plumber and Steamfitter of Canada

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TORONTO, FEBRUARY 1, 1915

Business Honestly Gained

THERE'S not the slightest doubt as to the reason why the British Empire is at war with Germany. Some people may have the opinion that when war was declared in August, that that was the beginning of war between us and Germany. Sueh, however is not the case. Germany has in aetual fact been at war with every possible industrial competitor for a great number of years, she no doubt has been planning all kinds of nefarious sehemes to capture business from foreign countries, and had to some extent succeeded up to August of 1914. At the beginning of last year her manufacturers evolved a scheme involving the subscription of over a quarter of a million dollars along with the assistanee of the German Government. This money was to have been circulated amongst buyers of goods, heads of departments, journalists and advertising men so as to induce them to either buy German produets or write favorable comments about goods made in Germany.

The facts were submitted to Sir Edward Grey, by the then British Ambassador at Berlin. Now, was that clean business? No, not by any means, and because of the fact that Germany has for years resorted to some sharp practiee or other, she is now waging a military and naval war with praetieally the whole of Europe.

The German people have been given eredit for the business methods that have been adopted by them, but woe to him who ever tries out the same practices in the future. Germany has aeted like the person who has been paying a visit to his neighbors' roost, secured a big basket of eggs, and in his hurry to get clear has let the lot fall and even lost his own eggs into the bargain.

Sanitary and heating engineers have to go further afield to create new business, let us hope that clean methods will be adopted, let us hope that quality goods will be handled, fair priees charged and no price-cutting. It is bad enough to resort to price-cutting on work near at one's door, but it will be far worse if resorted to upon work several miles away, and if the craft put up good work in these country places they must in all honesty charge a fair price.

Nothing is more detestable than to find that a fellow-member of the same association has eut on his assoeiate's price, and to do so has resorted to the use of a slightly inferior quality of goods.

How can assoeiations prosper? How can one member look the other in the face when such a thing has happened? Some argue that all is fair in love and war, as well as in business. That may have been true in the days gone by.

If sanitary and heating engineers do not adopt the golden rule in their business then they are at war, eommercially, with their fellow-eraftsmen. What is wanted to-day in all businesses is clean methods, honest methods and a little fellow-feeling. Therefore when digging up new business be sure and dig into the methods a little of the brotherly human element and by so doing create a lasting commereial peaee.

In history there are three men who eonquered the world. These men were Alexander the Great, Caesar and Napoleon. Future history will inelude the German Kaiser, William II, as one who tried to imitate these three, but who disastrously failed. These men had no desire for peace either eommereial or brotherly. Their methods of eonquering were by violence and brutal war. Peaee had no part in them. The first three were eventually failures, as will also the German war lord be.

Has it ever dawned upon our eraft that no part of their labors or the material they use has any part in war? No calling can claim to be as progressive, constructive and peaceable as that of the sanitary and heating engineer. The maehinery used to make bath tubs cannot be used to make bullets or any other implement to kill. Lathes and all other kinds of machinery used in making sanitary and heating brass goods cannot be made to turn out shrapnel shells. Rolling mills that make pipes and tubing cannot make gun barrels. Ours is an oeeupation of peace, then in continuing that oeeupation, let it be upon peaceable lines, and thus create amongst ourselves lasting, profitable, commercial peace.

Buy Only Advertised Goods

WHEN a traveler comes into your establishment and tells you he has a certain line of goods, the best value on earth, at half the price you would have to pay so and so for them—when he takes up a trade paper and points out a full-page advertisement bearing so and so's name, then tries to reason out with you that "He does not waste his money on puffy advertising, that you, Mr. Buyer, are getting extra value because of the money saved,"—what do you think about him and his goods? Do you believe all he says? We think not. That salesman is a back number and his goods are not 22 karat. He may say a lot about the goods he sells, but he dare not put it in print. In 99 cases out of a 100 the goods he sells you do not bear his company's name, they are as a rule gotten up for him to *sell,* and make a profit from, at your expense. A wagon load of $10 bills is only so much waste paper, unless the bills bear a reputable signature.

On the other hand, when you buy advertised goods, goods that bear the manufacturer's name, you buy goods that it will profit you to buy, goods worth every cent the manufacturer is worth.

Trade paper advertisements are the business man's reference library—the finger post to success. The best sanitary and heating engineering supplies that money will buy can be secured from those manufacturers whose names appear in the classified buyers' guide of every issue of The Sanitary Engineer.

Buy only such goods that are manufactured for you to buy, not those made for the other fellow to sell.

New Business

ON another page there appears an article entitled "Getting After New Business." It is founded upon actual experience. Some time ago we wrote to several members of the trade who we knew were doing quite a lot of business with the farmers and residents in rural districts and have gleaned the facts mentioned in the article referred to. We will be only too pleased to receive any letters from our readers which will show others how they are catering to the farmer and those living in districts where there are no municipal sewers or sewerage system.

We cannot urge our readers too strongly to get after this new field. Only the other day one of our subscribers from an Ontario town called in at the office and stated that his business had dropped to almost nil. After reading the various articles upon this subject, he took a drive out into the country and after about a week's effort, secured two contracts to install plumbing, heating, septic tank and pneumatic water system. These two contracts are the first of this kind he has ever secured, but he is thoroughly convinced of the possibilities for sanitary and heating engineers in this direction, if they will only get after this new business.

Do You Carry Fire Insurance?

HOW many sanitary and heating engineers are there who do not carry fire insurance? "Not many"—we hope is the answer. But how many know the kind of fire insurance policy they hold?

One of the most interesting articles ever published on this subject appears on another page of this issue. It is meat to the one who does not thoroughly understand how to buy fire insurance. No doubt most people are paying for some kind of fire insurance, but how much better is it to know exactly what one is buying. If there is one thing which every businessman should know more than another it is the way to buy the fire insurance policy which best suits his own particular case.

War and the Trade Paper

THE Financial Post has been running a series of articles with the object of interesting the Dominion Government in taking more comprehensive steps for the securing of war contracts for Canadian firms. In a recent article The Post says: Within a week after war broke out, a meeting of trade paper editors was called in London and their views as experts on business were published in the British papers to reassure the nation as to the stability of business. The Board of Trade called in consultation some of the leading editors. Lloyd George asked Sir George Paish, the editor of The Statist, a weekly commercial and financial paper, for advice in the emergency and eventually insisted upon him giving his whole time, until the war should be over, to the service of the Government as technical financier adviser, and the splendid way in which Britain has met the emergency has been due to this trade paper editor more than to any other factor, as was pointed out by J. W. Flavelle in an address a short time ago.

In the States, too, since the present emergency arose, the editors of the leading trade papers have been called to discuss conditions with the President and members of his Cabinet, but particularly with their Minister of Trade.

These class paper editors are the specialists in journalism. Their opinions are unbiased. They have no personal interests to serve. Their success depends upon how well they serve their readers as a whole. Any preference for any firm or clique would be fatal to the paper. They are constantly called upon by the courts for expert evidence in complicated cases. Occasionally they are consulted privately by judges desiring information to guide them in coming to a decision in business or technical cases. Of course these are mere incidents in the work of these journalists. Their chief object is to give the news of the particular trade or industry in which their readers are interested, news for which general, daily and weekly newspapers with their space crowded with war, crime, baseball or society news cannot afford space.

Editorial Briefs

THE MAN who advertises "Estimates free" pays dearly for them.

* * *

THE MAN who gives away his time and pays not his debts, is not a desirable debtor.

* * *

NO HONEST person will demand your time or money unless he is willing to pay for it.

* * *

A MAN devoting ten dollars' worth of time on "estimates free" is wasting the earning power of $200 for 365 days at 5 per cent.

Canada Metal Co.'s Annual Convention

Spirit of Optimism Prevails—The Year 1915 *to be a Good Year for Business in Spite of the War.*

THE third annual convention held in Toronto by the Canada Metal Co. Ltd., was a brilliant success. Each year this company gets their sales-staff together from all quarters of the Dominion. The managers from the factories at Winnipeg and Montreal bring in the salesmen who make their headquarters at these centres. When the roll was called nineteen were present.

Mr. W. G. Harris, Jr., vice-president of the company presided and his opening address was briefly a word of welcome, and he stated, what proved to be a fact, "This convention is to be a week of hard work for everyone and there will be little time for the usual frills outside business."

Mr. Harris, Sr., president and general manager of the company, had a cheery word of welcome for the salesmen and expressed his pleasure at being able to meet them all each year and to spend a few days going over past records and planning for future successes. He spoke of the wonderful growth of the company, how a very few years ago only very little ground was covered outside of Toronto, but to-day the whole of the Dominion is covered by nineteen salesmen.

The first morning was taken up by going over the yearly report of the sales for 1914 and many suggestions were made as to the plans for 1915, for, as one salesmen remarked, year by year our sales have increased and it will need some brilliant planning and hard work to go ahead in 1915, but we mean to do it, if at all possible. The afternoon was devoted to questions and suggestions. Among the subjects discussed might be mentioned one which should be interesting to all sanitary engineers.

The subject was: The connection between the manufacturer, the salesman and the sanitary engineer. It outlined the great advantage that a salesman who thoroughly understood the requirements of the trade had with his customers and the material assistance he could render.

All goods manufactured by the Canada Metal Co., Ltd., were exhibited at the convention and the manufacture of lead pipe, traps and bends, and the rolling of sheet lead were practically demonstrated.

Another day's work consisted of seeing brass goods made in the foundry. These included such interesting lines as soldering nipples, brass ferrules, etc. From the foundry the salesmen were taken to the brass-finishing department so they were able to see the process from the raw material to the finished product.

At noon each day luncheon was served and justice was certainly done to the chef's catering. Wednesday was called competition day and was devoted to distributing of prizes to the winners of the various competitions during 1914 and also to planning new competitions for 1915. These competitions bring efficiency and are highly approved by the salesmen. During 1914 over $1,000 was up for competition and among other prizes was a gold watch and chain valued at $150, and Mr. H. C. Crow, who has taken such interest in arranging these competitions and carrying them through to their ultimate success, had the honor of presenting the gold watch and chain to Mr. A. E. Byers, who was the winner in this special competition.

One evening the whole staff were the guests of the Company and visited Shea's theatre, so that notwithstanding that Mr.

(Continued on page 34.)

Salesmen attending the annual convention of Canada Metal Co.

H. Mahoney Elected Mayor of Guelph.

In spite of the fact that "plumbers" of a few years ago were looked upon with a certain amount of contempt, their offspring, the sanitary engineers, are filling the most honored positions that can possibly be given them. We have at least one filling the position of M. P. in the Federal House. Several were recently elected aldermen, reeves and chief magistrates, the last to be brought to our notice being that of Harry Mahoney of Guelph, who was elected by a majority of 910, the local vote polled being

H. MAHONEY,
Recently elected Mayor of Guelph by large majority.

2,104, the largest ever polled in Guelph. Of this number Mahoney received 1,507 and his opponent, ex-Alderman Hannigan received 597.

Harry is a splendid worker and is earnest. He is a great association man and whenever present at the various meetings never fails to put new life into them. Sanitary Engineer joins with all his friends and associates in wishing him a prosperous year, knowing full well he will earn honors by faithful service both to his craft and to those who elected him as chief magistrate of Guelph.

Moving to New Premises.

The Dominion Radiator Co., Ltd., Montreal, are moving their warehouse and offices from 146 Craig Street West to their new building at the corner of Hutchinson and Lannes streets, Outremont.

Joining the Matrimonial Contingent.

Congratulations to S. B. Picken, traveller, in Montreal and outskirts, for the Dominion Radiator Co., who is engaged to be married.

Doings in Montreal.

The plumbing business, like nearly all others, is suffering slightly from the effects of the war. Here and there are some who require a little accommodation, but manufacturers, on the whole, are quite willing to grant this. A number of plumbers here and there have been unable to survive the depression, in many cases through lack of capital. There will be considerable repair business done in Montreal owing to the fact that landlords are being compelled to make repairs to their houses in order to rent them, repairs which have in some cases been delayed for several years.

Sanitary Engineers Busy.

The sanitary and heating engineering department of the Miekus hardware store commenced work on their contract with the town of Hespeler for the plumbing of the new town hall. The contract figure exceeds three thousand dollars.

Attends Convention in New York.

F. S. Samson, manager of J. H. Ashdown's wholesale sanitary and heating supply department, paid a vist to New York recently and was in attendance at the convention of sanitary engineers there.

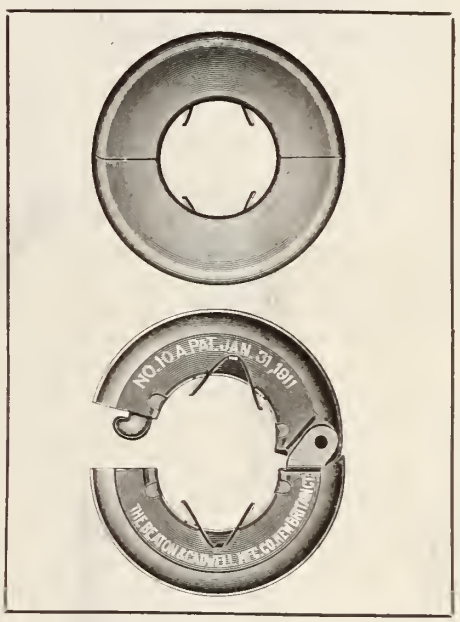
Winnipeg Situation.

That Winnipeg has been brought to a most satisfactory condition as regards sanitation was the opinion of the board of control when a letter from the health department was read recently, stating that the annual survey made by the department had been completed and there were only 660 houses in Winnipeg on streets without sewer and water and which are, therefore, without proper plumbing.

NEW GOODS.

New Floor and Ceiling Plates.

If there is one thing more than another which gives a riser or main a neat finish when passing through a floor, ceiling or partition, it is a good-looking floor or ceiling plate. The solid floor and ceiling plate, be the kind whatever it may, cannot hold its appearance when placed on a riser or main during construction,



at least unless it is securely wrapped. Even then, the solid floor plate will become soiled and rusted. The split ceiling plate is coming more into use than ever and always gives a nice finish, because it can be attached to mains and risers at the very last, and is not exposed during completion of a building. Great improvements in floor and ceiling plates have taken place recently, but one of the latest to be brought to our notice is that of the Beaton & Cadwell's No. 10a, a cut of which appears above. A new booklet has been recently issued describing the above lines which may be secured by applying to Messrs. Beaton & Cadwell, New Britain, Conn.

Sanitary Methods of Sewage Disposal

This Series Will Deal With the Sanitary Methods of Sewage Disposal in Rural Districts, Where There Are No Drainage Systems—Even Large Cities Are Realizing That Sewers and Drainage Systems Are Not By Any Means Disposal Systems.

THERE is no question in the world to-day which is so vital as that of sanitation. Sanitation and Sanitary conditions or insanitary conditions can, and will, either "mend or mar" the human race. In warfare as in peace no question is so vital to the well-being of humanity as that of sanitation. Large towns and cities all over the world are suffering great loss of life, because of their sins of omission to provide proper sanitary systems of sewage disposal.

These communities have grown and have as it were been living in a fool's paradise. Great sewers and drainage schemes have been evolved for the purpose of carrying away the sewage from our doors. Some of the finest sources of water supplies have become so polluted as to render the water totally unfit for human consumption.

The creator has provide natural sources and we have polluted them

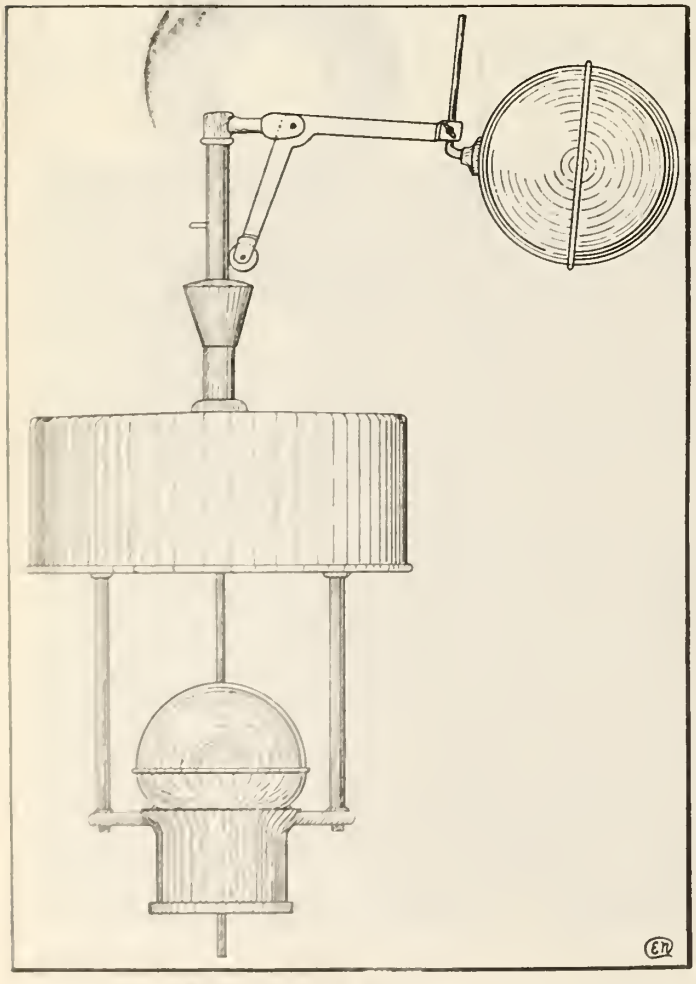
This has not in every case been wilfully done. There is still a class of men who cling to the old idea of sewage disposal by dilution, and to these can be attributed the blame for most of our water pollution.

Some years ago the sanitary authorities of the city of Chicago desired to acquire the right to take water from Lake Michigan for the purpose of diluting that city's sewage. It was pointed out that such a system was utterly absurd, involving, as it would have done, no less than from 10,000 to 20,000 cubic feet of water per second, which would have not only been a great waste of water, but would have been an insanitary method of sewage disposal. The following are a few words taken from the petition presented by the Dominion Government to the Government of the U. S. A.: "We feel confident that the interests of humanity at Chicago, as well as the levels of the Great lakes, and of the St. Lawrence river, can best be protected by the installation of a modern system of sewage dis-

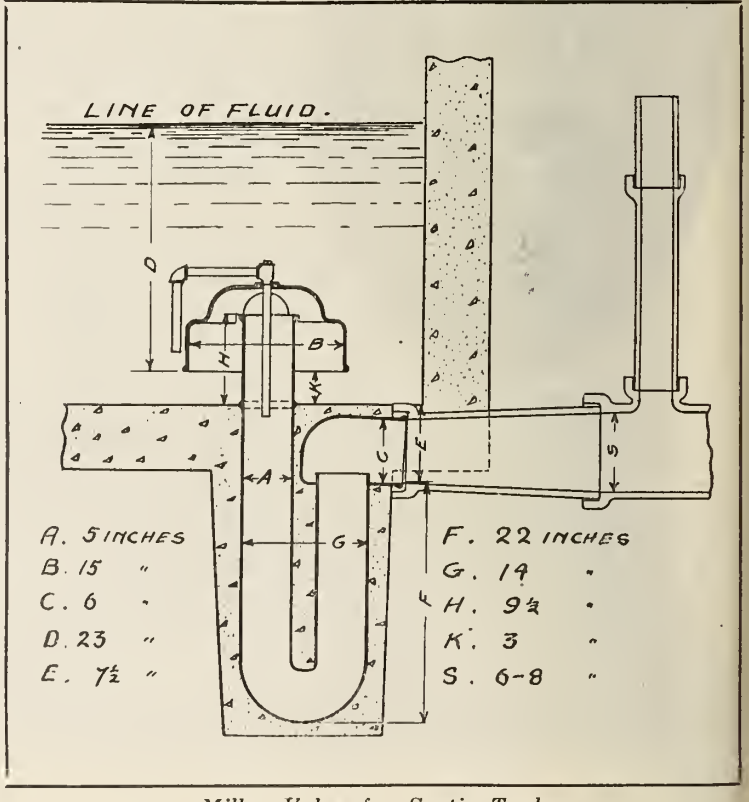
ON account of The Sanitary Engineer urging upon the trade to get after new business which is, as it were, waiting for the picking up, the question of sewage disposal in country homes has again been brought to our notice. Enquiries upon the subject have poured in from all over the Dominion. We have therefore decided to publish a series of articles on the subject which will be as simple and clear as possible, and we ask our readers to call our attention to any points in the articles which may not seem quite clear. We do not, however, propose to describe any systems of sewage disposal which will not meet the requirements of any and every board of health.

Several of our contemporaries have published and described systems which could not be endorsed by any sanitary engineer of practical experience, or by bacteriologists.

EDITOR.



Quinn Valve for Septic Tank.



Miller Valve for Septic Tank.

posal, rather than by using a method of dilution which has been shown to be injurious to both nations, and further, that the interests of the public generally will, thus, be protected, and their welfare promoted."

In spite of the fact that in almost every province of the Dominion of Canada, there is a law forbidding the pollution of lakes, streams or navigable waterways, yet nearly every city is breaking this law.

It is the same with the construction of cesspools. It is against the law to build a cesspool anywhere in Canada, but it is done, not always wilfully, but rather owing to ignorance or with a view to getting rid of something which is obnoxious and filthy. Many of our readers possibly do not know what a cesspool really is. The term "cess" means "cease." hence a cesspool really means a "ceasepool." The very term would indicate that a cesspool is used for something to cease, an opposite to action. If sewage is made to "cease" by the use of a cesspool it really ceases to act and will become putrid and dangerous.

The very fact of sewage running from a building into a cesspool is proof that there exist, somewhere, conditions of an insanitary nature. We may not realize it for many years, but nevertheless such is a fact, and the longer a cesspool is in existence the greater the contamination.

There is no limit to the distance which such contamination can travel, and wells all over the country are being fouled by the filthy contraption known as a cesspool. One person told the writer, a few years ago when this question arose, that he built a cesspool over 10 years ago and had never had one bit of trouble with it. The very next year several wells were found to be in a state of pollution, and several deaths were reported in that district from typhoid fever. There was a case which took over ten years to be found out; the pollution of the earth took place first, afterwards the wells, and then several deaths resulted. The water of the Ottawa river is being polluted by almost every town or city situated upon its banks, and what has been the result? Hundreds of lives have been losa.

The question is, how can sewage be disposed of—not simply carried away to locations unknown, underground. The method of dilution has been proved as inadequate, and the cesspool insanitary and deadly. We must find out what other methods may he adopted.

Fig. 1 is a Quinn valve, and operates in a very simple manner, very much after the style of an ordinary W.C. tank. As the fluid rises in the tank it operates the ball, which, as will be seen, releases the bell. This bell comes into contact with a brass rod which is attached to the lower copper ball or float, at the bottom of which is fitted a rubber feather-edge washer. As soon as the fluid is emptied, the float falls back into its place lowering the bell, and the valve is again closed.

Fig. 2 is a Miller syphon. This apparatus has no moving parts and operates hy the fluid rising in the tank and sealing the bell B: as the fluid rises it compresses the air in the long leg A.

Before starting these syphons the trap must be filled with water and the bell B placed in position as shown. The small pipe shown in the centre and through the top of the bell is for the purpose of hreaking the syphonic action when the tank is emptied. In some styles of Miller syphons this pipe has been dispensed with and a small hole is now drilled through the lower edge of the bell. Fig. 1 can be bought in two sizes, 2 inch and 4 inch. Fig. 2 is made in sizes from 3 inches to 8 inches. We will show other styles of flushing appliances in further issues.

(Continued in next issue.)

ADVERTISING.

Advertising in a trade paper is simply stating openly who you are and what your business is. It is pointing out to the readers that you have something of service for them, a commodity of usefulness to profit both you and them. The only men who do not advertise are those who have nothing to offer. They are dead, even if they do not know it.

RELATIVE TO STEAM.

Definition.—Steam is water vapor or is water changed to the gaseous form by heat.

Intensity of heat is measured in degrees by means of a thermometer. The Fahrenheit or F. thermometer is used almost entirely in this country.

Definition.—A british Thermal unit or a B.T.U. is the amount of heat required to raise one pound of water one degree F.

This quantity of heat is different for different substances. Thus, it takes less than a B.T.U. to raise one pound of copper one degree F., but water is used as the standard.

Consider one pound of ice at the freezing point. It requires 144 B.T.U. to change the one pound of ice at 32 degrees to one pound of water at the same temperature, and the temperature of the mixture cannot be raised until all the ice is melted. To heat the water to the boiling point will require approximately 180 B.T.U. or one B.T.U. for every degree rise in temperature. If heat still be added, the water will not become any hotter, but a quantity of it will be changed to steam.

To change the whole pound of water to steam will require 966 B.T.U. Part of this heat is used up in expanding the steam against the pressure of the atmosphere, but the most of it is, like the heat used in melting ice, used up in changing the condition of the substance. As long as any water is present, the steam is known as saturated steam, and the temperature of the mixture cannot be raised above the boiling point, or 212 degrees F. When evaporation is complete and still more heat is added, the steam becomes hotter than 212 degrees and is called superheated steam.

Definition.—Saturated or wet steam is steam in contact with water no matter what its pressure may be or, it is steam whose temperature is the same as the temperature of the boiling point corresponding to its pressure.

Definition. — Superheated steam is steam whose temperature is higher than the temperature of the boiling point corresponding to its temperature. To accomplish this, it must be superheated out of contact with water.—Power House.

THE BUSY MAN'S CREED.

I believe in the stuff I'm handing out, in the firm I am working for, and in my ability to get results.

I believe that honest stuff can be passed out to honest men by honest methods.

I believe in working, not weeping; in boosting, not knocking; and in the pleasure of my job.

I believe that a man gets what he goes after, that one deed done to-day is worth two deeds to-morrow, and that no man is down and out until he has lost faith in himself.

I believe in to-day and the work I am doing; in to-morrow and the work I hope to do, and in the sure reward which the future holds.

I believe in courtesy, in kindness, in generosity, in good-cheer, in friendship and in honest competition.

I believe there is something doing somewhere, for every man ready to do it.

I believe I'm ready—RIGHT NOW!

—Elbert Hubbard.

The more goods you show, the more people you will interest. The more goods you show-card, the more sales you make.

In some stores we see examples of economy gone to seed. It is well to be careful of expenditures, but it is not well to be penny wise and pound foolish.

New Canadian Patents

No. 157,316.

Stanley Lightfoot, Toronto, assignee of John Calicott, Bradford, born in Ontario, Canada, 11th August, 1914. Filed 28th February, 1914. Receipt No. 235,319.

Claim.—1. An air vent comprising an outer casing with an outlet in its upper end, an inner casing having orifices at each end thereof, said inner casing being substantially smaller than the interior of said outer casing, a nipple communicating with said inner casing, a valve arranged in the outer casing above said inner casing, said valve normally closing the orifice in the top of said inner casing, and means whereby said valve may be caused to close the orifice in said outer casing under the influence of a predetermined pressure within said casings.

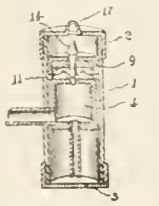


Fig. 1.

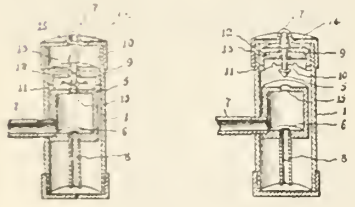


Fig. 2 Fig. 3.

2. An air vent comprising an outer casing with an outlet in the upper end, an inner casing having orifices at each end thereof, said inner casing being substantially smaller than the interior of said outer casing, a nipple communicating with said inner casing, a movable section arranged in the outer casing above said inner casing, said section having an orifice therein, and a valve loosely accommodated in the orifice in said section, said valve normally closing the upper orifice in said inner casing and adapted to close the orifice in said outer casing under the influence of a predetermined pressure within said casings.

3. An air vent comprising an outer casing with an outlet in the upper end, an inner casing having orifices at each end thereof, said inner casing being substantially smaller than the interior of said outer casing, a nipple communicating with the said inner casing, a movable weighted section arranged in the outer casing above, said section having an orifice therein, and a valve loosely accommodated in the orifice in said section, said valve normally closing the upper orifice in said inner casing and adapted to close the orifice in said outer casing under the influence of a predetermined pressure within said casings.

4. An air vent comprising an outer casing with an outlet in the upper end, an inner casing having orifices at each end thereof, said inner casing being substantially smaller than the interior of said outer casing, a nipple communicating with said inner casing, a movable inverted cup-like section arranged in the outer casing above said inner casing, said section having an orifice therein, and a valve loosely accommodated in the orifice in said section, said valve normally closing the upper orifice in said inner casing and adapted to close the orifice in said outer casing under the influence of a predetermined pressure within said casings.

* * *

No. 157,534.

Roy Drummond, Seattle, Washington, U.S.A., 25th August, 1914; 6 years. Filed 16th March, 1914. Receipt No. 235,093.

Claim.—1. A wrench comprising a shank element formed with a fixed jaw having a curved smooth jaw face and a serrated jaw face leading from the smooth jaw face, and movable jaw adapted for co-operation with the faces of the fixed jaw and having a smooth flat jaw face formed with opposing shoulders to receive a flat surface and curved serrated jaw face.

2. A wrench comprising a shank element formed with a fixed jaw having a curved smooth jaw face and a serrated jaw face leading from the smooth jaw face and lying within the plane of curvature of the latter face to provide a shoulder between the faces, and a movable jaw adapted for co-operation with the faces of the fixed jaw and having a flat jaw face formed with opposing shoulders to receive a flat surface and a curved jaw face to oppose the serrated face of the fixed jaw.

3. A wrench comprising a shank element formed with a fixed jaw having a smooth face and a serrated face on one side and a curved serrated face on the other side of the fixed jaw, and a jaw pivoted to the fixed jaw and formed with a flat face to co-operate with the smooth face of the fixed jaw whereby either jaw face of the pivoted jaw is jacent serrated face of said fixed jaw, said pivoted jaw being adapted to swing to oppose the curved face of the fixed jaw whereby either jaw face of the pivoted jaw is adapted for co-operation with the last-named face of the fixed jaw.

4. A wrench comprising a shank element formed with a fixed jaw having a curved jaw face, and a movable jaw pivoted to the shank element and provided with a curved jaw face and a flat jaw face leading from the latter, said pivoted jaw also being formed with a shoulder extending outwardly from the flat jaw face at the inner end thereof to be intermediate the jaw faces.

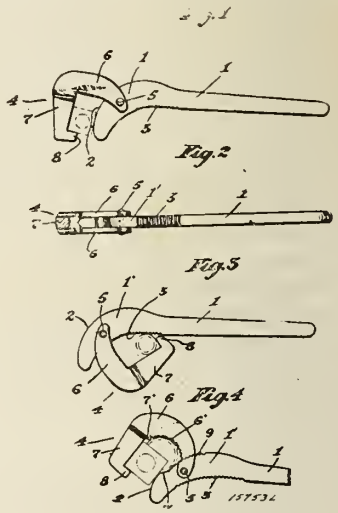


Fig. 2

Fig. 3

Fig. 4

Wrench.

* * *

No. 157,317.

Charles P. Monash, assignee of James H. Martin, Jr., both of Chicago, Illinois, U.S.A., 11th August, 1914; 6 years. Filed 14th January, 1914. Receipt No. 233,417.

Claim.—1. In a thermostatic trap, the combination of a casing having an inlet passage for water and having also a water discharging chamber and an outlet passage leading therefrom, and a port furnishing communication between the inlet and chamber, a slidable valve member controlling the port, a thermostatic member in the water discharging chamber for actuating the valve, and a yieldable bumper externally engaging the thermostatic member and operating to prevent ill-effects from over-expansion of the thermostatic member, substantially as described.

2. In a thermostatic trap, the combination of a casing having an inlet passage provided with a sediment retaining sec-

tion, and having also a water discharging chamber and an outlet passage leading therefrom, and a port furnishing communication between the inlet passage and the discharging chamber, a slidable valve member controlling the port, a thermostatic member in the water discharging chamber for actuating the valve in one direction, and a yieldable bumper externally engaging the thermostatic member and operating to prevent ill-effects from over-expansion of the thermostatic member, substantially as described.

3. In a thermostatic trap, the combination of a casing having an inlet passage for water of condensation and having also a water discharging chamber and an outlet passage leading therefrom, and a port furnishing communication between the inlet passage and the water discharging chamber, a slidable horizontal valve member controlling the port, a vertical thermostatic member for actuating the valve in one direction, the inflowing water actuating the valve in the opposite direction, and a yieldable horizontal bumper externally engaging the thermostatic member and operating to prevent ill-effects from over expansion of the thermostatic member loosely located between the valve and bumper, substantially as described.

4. In a thermostatic trap, the combination of a casing having an inlet passage provided with a sediment retaining section, and having also a water discharging chamber and an outlet passage leading therefrom, and a port furnishing communication between the inlet passage and the water discharging chamber, a slidable horizontal valve member controlling the port, a vertical thermostatic member for moving the valve member to open the port, the inflowing water moving the valve member to open the port, and a yieldable horizontal bumper externally engaging the thermostatic member, said thermostatic member loosely located and held between the valve and bumper, substantially as described.

* * *

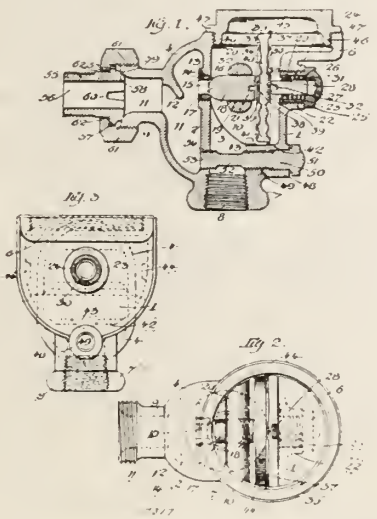
No. 157,441.—Shower Bath.

Andrew E. Kenney, North Plainfield, New Jersey, U.S.A., 18th August, 1914; 6 years. Filed 16th October, 1913. Receipt No. 229,714.

Claim.—1. In a shower bath, the combination with a tub, of a pair of nozzles located in substantially the same horizontal plane and at a point above the rim of the tub, a second pair of nozzles located above the first pair of substantially the same horizontal plane, each pair of nozzles disposed to direct their streams on converging and downwardly inclined lines whereby the streams from the nozzles will fall within the confines of the tub, and means for supplying water to the nozzles.

2. In a shower bath, the combination with a tub having hot and cold water faucets, a supporting bar resting upon and bridging the space between the two faucets, a clamping bar engaging beneath the two faucets, means for forcing the two bars together to clamp them upon the faucets, a hollow upright column rising from the supporting bar, laterally extending arms carried by the column, nozzles carried by said arms disposed to direct their streams on converging and downwardly inclined lines so that the streams shall fall within the confines of the tub, and a water supply connection between the faucets and the upright column.

3. In a shower bath, the combination with a tub, of a pair of nozzles arranged in spaced relation and disposed to direct their streams on converging lines downwardly inclined into the tub so that such



Thermostatic Valve.

streams shall fall wholly within the confines of the tub, a second pair of nozzles located above the first pair and disposed to direct their streams on converging and downwardly inclined lines so as to fall wholly within the confines of the tub, the second pair of nozzles being also disposed in spaced relation but offset from the vertical plane of the lower pair to prevent drippings from the upper pair of nozzles from falling on the lower pair of nozzles and being splashed by such contact.

* * *

No 157,228.—Wrench.

Walter Herbert Cook, London, England, 4th August, 1914; 6 years. Filed 12th September, 1913. Receipt No. 228,848.

Claim.—1. A wrench of the type in which the jaws automatically engage on the operative stroke and ratchet on the return stroke, comprising a shank having a head fitted with a curved row of teeth, the outermost tooth of each end being milled only on its inside face, a fixed member on which the shank head is secured by means of a pivot, said member having parallel side plates connected with one of the jaws of the wrench and between which plates the head of the shank is mounted, circular shoulders on said shank head and around said pivot, said shoulders being at right angles to the said head, squared recesses in said side plates to receive said shoulders, a movable member carrying the second jaw of the wrench and having a web adapted to be slidden between the said side plates, teeth on the underside of said web and adapted to engage the teeth on the shank head, the extremital teeth on said web being cut away to correspond with the outermost teeth on the shank head, a rib on one of the side plates and a groove in said web, said rib entering said groove and being so shaped as to afford a dovetail joint, and said shank and said fixed and moveable jaw carrying members being so symmetrically disposed that when the jaws are in the half fully-open position the longitudinal axis of the shank continued through the pivot passes through the centre of the space between the half open jaws.

2. A wrench of the type described, comprising a shank having a head fitted with teeth, a fixed member on which the shank head is secured by means of a pivot, said fixed member having parallel side plates connected with one of the jaws of the wrench and between which plates the head of the shank is mounted, circular shoulders on said shank head and around said pivot, said shoulders being at right angles to the said head, squared recesses in said side plates to receive said shoulders, a movable member carrying the second jaw of the wrench and having a web adapted to be slidden between the said side plates, teeth on the underside of said web and adapted to engage the teeth of the shank head, a rib on one of the side plates and a groove in said web, said rib entering said groove, the jaws carried by said fixed and movable members being so shaped as to be contracted and convergent at their outer extremities.

* * *

No. 156,752.—Generator for Hot Water Heaters.

James A. McEachern, Charlottetown, Prince Edward Island, Canada, 7th July, 1914; 6 years. Filed 23rd October, 1913. Receipt No. 230,358.

Claim.—1. A device for the purpose specified, comprising an expansion tank, a pipe leading to said expansion tank formed with two branches, a check valve in one branch permitting water to flow

(Continued on page 34.)

Practical Course for Sheet Metal Workers

Article No. 10 of Series

By CHARLES SEIVERS

DEFINITION of solid figures. A solid has length, breadth and thickness. The boundaries of a solid are surfaces.

A Cube. Fig. 1.

A cube is a solid figure contained by six equal squares or sides.

A Prism. Fig. 2.

A prism is a solid having similar, equal and parallel bases or ends, its sides forming similar or equal parallelograms.

A Pyramid. Fig. 3.

A pyramid is a solid body, on a triangular or polygonal, or a square base, and terminating in a point at the top. The figures outlined by A, B, C show part of the base, the point E is the apex.

A Cylinder. Fig. 4.

A cylinder is a long round body of uniform circumference or a solid figure described by the revolution of a right-angled parallelogram about one of its sides, which remains fixed.

A Cone. Fig. 5.

A cone is a solid described by the revolution of a right-angled triangle, about the side containing the right-angle which remains fixed. The base of the cone as at A, B, C, is a circle, the point E is the apex.

A Sphere. Fig. 6.

A sphere is a solid or volume bounded by a surface, every point of which is equally distant from a point within, called a centre.

Montreal Association Annual Euchre and Dance.

The Montreal and vicinity sanitary and heating engineers association are holding their annual euchre and dance on Tuesday, Feb. 9, in the Majestic Hall, Guy street. The proceeds will be donated to the Red Cross Society. It is expected that as large a number will be present as last year, when fifteen costly prizes were given away, nine to ladies and six to gentlemen. The following is the programme:

1, waltz; 2, two-step; 3, gavotte; 4, waltz lancers; 5, Bellefield; 6, one-step; 7, three-step; 8, Venus; 9, two-step; 10, Oxford minuet; 1, 2, 3, extras; 11, waltz; 12, two-step; 13, gavotte; 14, waltz lancers; 15, one-step; 16, Spanish Boston; 17, Ostend; 18, hesitation; 19, two-step; 20, home waltz.

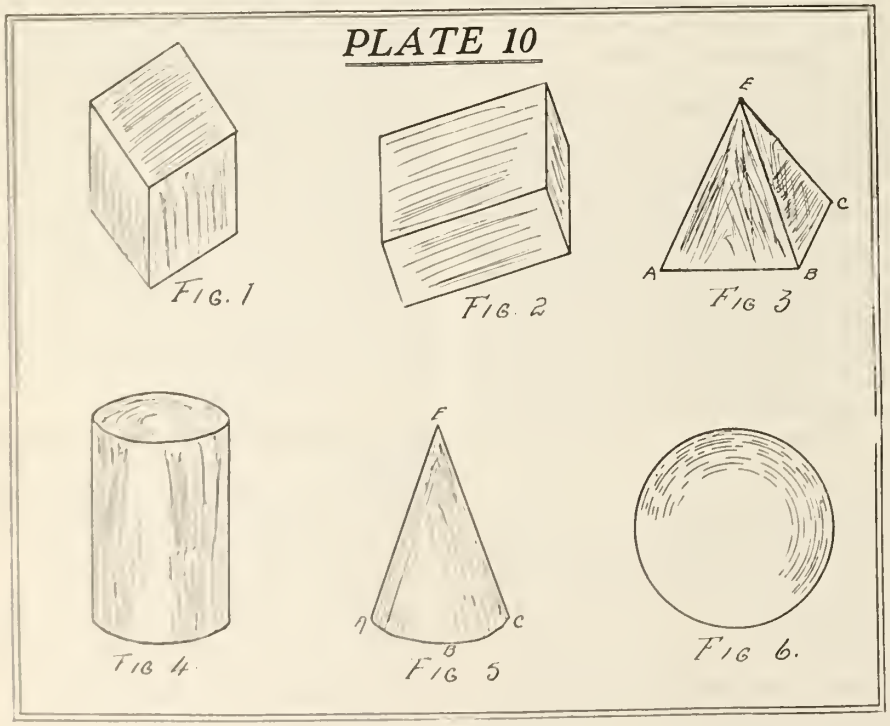
New President Elected.

At the annual meeting of the Sanitary and Heating Engineers' Association of Montreal and vicinity, recently held, A. Charette was elected president. The following is a list of other officers:

1st vice-president, L. J. Conroy; 2nd vice-president, Walter Ryan; past president, R. J. McCauley; Chairmen of standing committees: sanitation committee, P. C. Ogilvie; Arbitration committee, W. R. J. Hughes; Legislation committee, Jos. Laurner; Apprentice committee, Jos. Thibeault; Price List committee, J. E. Walsh. Representative director on Builders' Exchange Board, R. J. McCauley. Audit Committee: J. E. Walsh, W. J. Graham, John Watson. Trustees: Jas. Ballantyne, Jos. Laurier, J. R. Meadowcroft; hon. secretary, Jas. Griffin; secretary, A. J. Hoolahan.

A. CHARETTE,
Newly elected president.

Mr. Charette is the sole partner in the firm of Charette & Frere, plumbers, tinsmiths, roofers and electricians, 414 Ontario street East, since the death of his brother. He has been in busines for himself for twelve years and engaged in the trade for thirty-eight years. He is also a dealer in stoves and manufacturer of the "Artizan" gas range. He was first vice-president of the Master Plumbers' Association last year and his election to the presidency was unanimous.



Who Should Do the Planning?

A Question Which is Not Given Sufficient Importance — Showing the Need for the Sanitary and Heating Engineer Being the One and Only One Who Should be Consulted Regarding the Planning of Fixtures, Radiators, Etc.

TIMES out of number the question has been put to The Sanitary Engineer as to who should decide which is the best location for the various sanitary fixtures and radiators. For various reasons, we maintain that the sanitary and heating engineer should be the one to make the decision.

An architect drafts out a set of plans for a residence; the position of the fixtures is decided upon and the owner appears to be thoroughly satisfied with every item, and the general layout.

The sanitary and heating engineer is asked to submit tenders, but is neither asked nor allowed to comment upon the location of the fixtures. If he should venture to suggest that some of the waste pipes could be shortened by a rearrangement of the fixtures, the architect will simply reply that the plans must be followed out.

Thus the work proceeds and in many cases the whole installation could, by certain changes, have been made less costly, as well as more efficient.

Long waste pipes, as every sanitary engineer knows, should not be permitted, particularly that of the sink waste, and when there are long waste pipes there must also be long back-vent pipes. Many an installation would be 10 to 15 per cent. cheaper if the sanitary engineer were the person to be first consulted. Not only so, but where long waste pipes are installed, or awkward bends or twists have to be made there is greater danger of the waste pipes becoming choked, or the waste water will not leave the fixtures as quickly as it would if the system had been laid out in a more direct manner.

These long runs of waste piping are a source of revenue for the sanitary engineer, but, to say the least, a very questionable source.

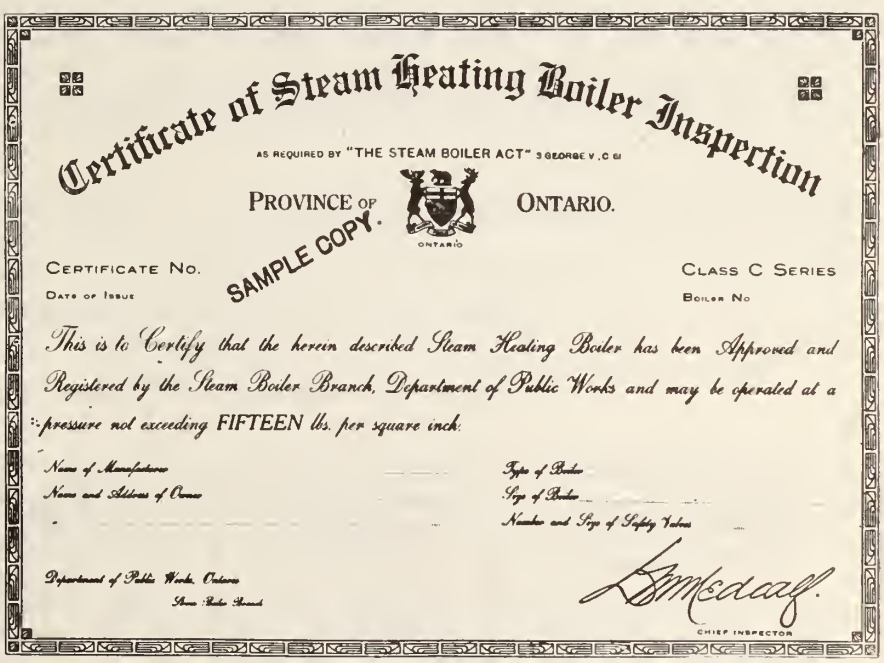
The public are beginning to ask why such and such a fixture could not have been placed here or there, thus avoiding unnecessarily long pipes. This proves that the time has come when sanitary and heating engineers must assert their position, and let the public know that they are out to give the best possible service, and to show "why" the sanitary and heating engineer is the one to be consulted, rather than the architect.

We have several plans before us at the time of writing which are altogether ridiculous. But the work no doubt will be installed as shown, and will never be what it should be, because of the poor planning of the positions of the fixtures. To-day there are quite a number of architects advocating the resurrection of the old dust-gathering grill work for covering up radiators and not a few heating engineers are installing them. Their plea is that a radiator is not a thing of beauty, and that its presence spoils the various artistic features of a room.

No one would attempt to claim that a radiator is a thing of beauty as compared with other articles in evidence in most parlors or dining rooms, but actual beauty is in the eye of the beholder, and the most beautifully furnished room which lacked any provision to keep the room warm would present by no means an enticing prospect. The ventilation in a home is very seldom referred to by the architect because he knows so little about it. Then, again, there is the question of humidity. Not in one plan out of a thousand is any provision made for regulating the humidity of the home, and if the sanitary and heating engineer were to broach the subject, the architect would resent it.

The question of keeping a house clean is something which comes under the heading of sanitation, yet how many houses are there in existence where any provision is made for keeping a house free from dust. Up to date the vacuum cleaner is seldom if ever thought of by the average architect. Of course we do not wish to cast any undue reflection upon the abilities of the architect, but we are simply desirous of pointing out that the sanitary and heating engineer is the one to be consulted upon the various subjects aforementioned. The corn broom, that old disturber of dust, is a thing which every sanitary engineer should wage war against to the bitter end, and no house should be built without a system of piping, and a stationary vacuum cleaner being installed.

What would anyone think of a house without a W.C., yet dust is just as injurious, if not more so, than the odor from an old outside closet. No doubt such odors are unpleasant and should be carried away by efficient ventilation; but dust is not taken into consideration at all. Dust is the housewife's biggest trouble and cannot be removed entirely from a home or building by the use of a broom. Therefore if sanitary and heating engineers were to be first consulted and every convenience installed which we have mentioned, the home would be in reality a home. To-day it is only a home to the one employed outside, and then not as healthy as it might be, and to the housewife is nothing more nor less than a pestiferous workshop.



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Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

Cuts Became Twisted.

Editor The Sanitary Engineer:

I sent you a question in about style of a warm air furnace and you answered it all right in your last issue, but somehow the illustrations got switched. The one I sent you was Fig. 1, not Fig. 2. I think you should correct this matter in your next issue, because unfortunately there are quite a lot of so-called furnace men who claim that the sketch I sent in is right.

TINSHOP.

There is an old saying, that if the coroner has to visit a town because of a murder or other accident which results in the death of a person, that coroner will be called to that town again very soon and will require to make in all three visits on account of two or more accidental deaths, before the locality will be allowed to be at rest. The same thing seems to have taken place with us recently; we had to make two corrections in our last issue, and along comes another. Our readers will please note the difference by referring to the sketches below, and those of last issue. Fig. 1 is the sketch submitted by our enquirer, and Fig. 2 shows the suggested improvement.—Editor.

* * *

What is the Air Line For?

Editor The Sanitary Engineer:

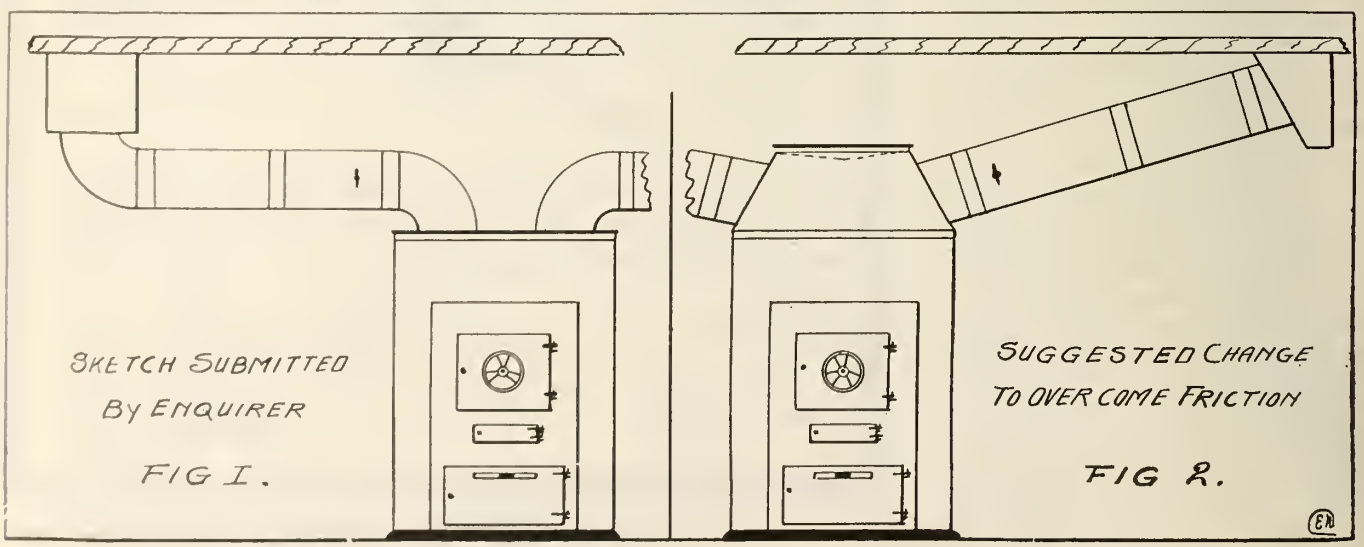
What is the air-line used for? How does it work? How is the vacuum produced without a pump? Could you show a diagram from radiator to wherever it goes?

INQUISITOR.

This question is one which appeared in a previous issue, but which space would not permit answering.

The air line is simply a system of small pipes connected to the air-valve on a steam system of heating. We have never heard of a mere air-line pipe or system creating a vacuum. There are various methods of connecting up an air-line. One old-established method was to install a line of say ¼-inch pipe to each radiator with a ¼ x ⅛ elbow, and run a line of ¼-inch pipe to some handy point in the furnace or boiler room. Then all the ¼-inch pipes were connected into a header made up with 1 inch x ¼-inch tees and nipples. Thus a one inch valve controlled the whole number of air lines until such a period as they each thermostatically closed. A separate common air valve was placed on each ¼-in. branch. See Fig. 1. This of course would be on a one-pipe steam system. Another method which has been called a vacuum system is to connect an air line and automatic air-line valve to a pump. The pump creates the vacuum, which is broken as soon as steam enters the radiator. There are also several systems of steam heating which no doubt can rightly claim to be vacuum systems. But these do not claim a high vacuum. The principle upon which they work is that a vacuum is established between the radiator and a tank receiver. There must be some appliance other than an air valve to maintain a vacuum constantly.

See Fig. 3 on page 34.



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6. Give a rough sketch of the situation, showing elevation and location.

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A READER'S SUGGESTION.

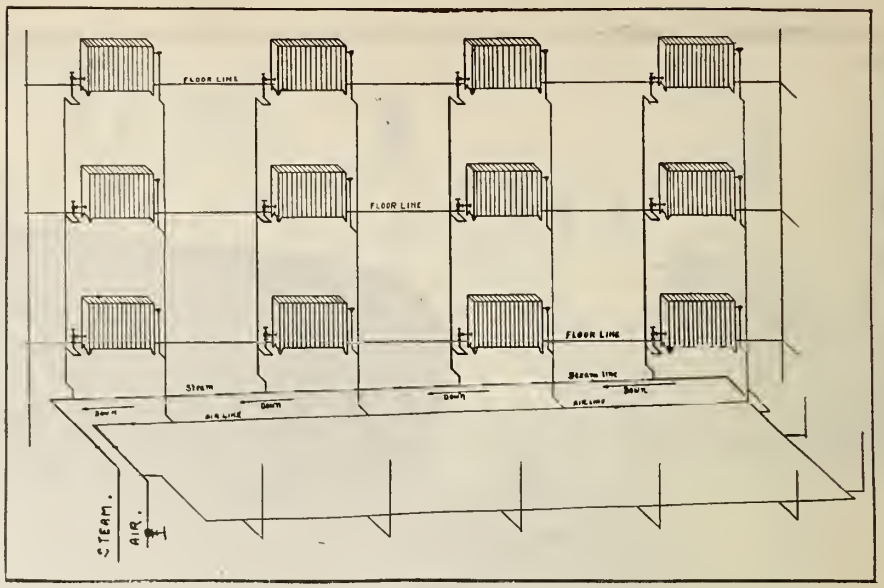
Editor The Sanitary Engineer:

Referring to your issue of January 1, the article under heading of Domestic Hot Water Supply problems reminds me of a job I was sent to look over about ten months ago. No one on the premises could sleep at night owing to a racket at the range boiler worse than a Scotch pipe-band, they told me. The boiler was hooked up after the same fashion as shown in the issue mentioned on page 24, Fig. 2.

After looking it over I came to the conclusion that probably air collected from the top connection to the inside top of the boiler. I got to work and installed it as per drawing enclosed and up till now peace reigns in that previously afflicted domicile.

J. G. N.,
Lethbridge, Alta.

We have reprodnced the sketch submitted by J. G. N., which no doubt has certainly one point in its favor, that of eliminating the possibility of air collecting. But while he has found trouble of that kind, it may not have been caused by air, though we appreciate the suggestion. There is one feature which J. E. N. has not provided for, that of drawing any sediment from the boiler. The small ½-inch pet-cock would not be quite as efficient as the one shown in Fig. 2. At the same time, no doubt, Fig. 2 would have been improved if there had been some provision made to let the air off from the pocket in top of the tank.—Editor.



Showing a series of radiators connected up and fitted with an air line main in basement.

CANADA METAL COMPANY'S ANNUAL CONVENTION.

(Continued from Page 30.)

Harris Jr., declared the convention would have no frills away from hard work, yet it will be noticed a few frills did creep in. Thursday was Western day and was most interesting as giving an outline of the prospects for 1915 in this territory. the salesmen from Winnipeg and Vancouver were certainly optimists regarding the prospects for the coming season and with increased acreage being under cultivation they look for things booming in the West once more in the near future.

Friday the last of the visitors packed up and the opinion was unanimous that the convention could only be described as a brilliant success and for interest, service and instruction was bound to prove of valuable assistance to all selesmen having the privilege of attending.

PREPARE FOR THE BOOM.

Thomas A. Edison, America's wizard of invention, was recently interviewed by the New York World, and when he speaks his words are always closely followed. Mr. Edison spoke of "worry" and of "the European war and the effects of both on business in this country."

"It has surprised me to see how Americans have become weakened over this war. They seem to be stricken with a sort of commercial paralysis. They want to get out and do something. Now is the opportune time.

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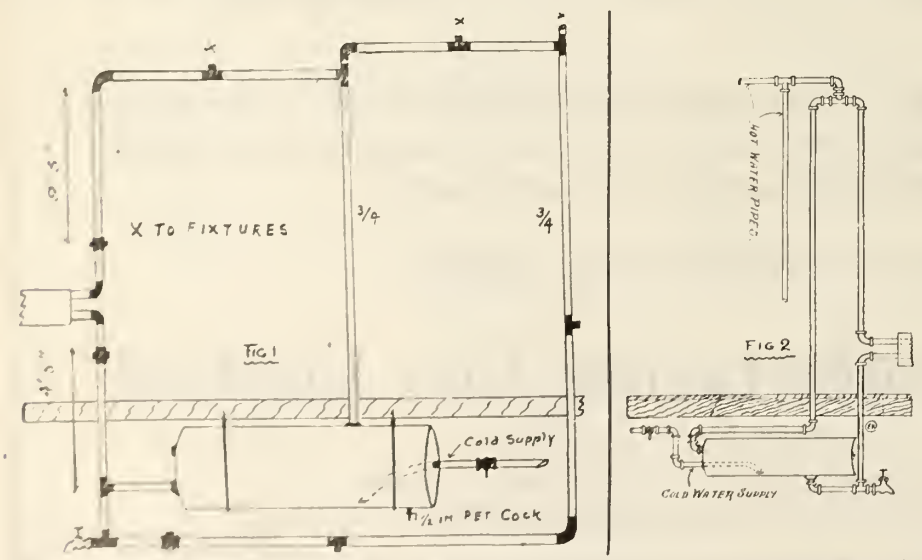

Fig. 1 is sketch submitted by our correspondent. Fig. 2 is the installation he is referring to.

GENERATOR FOR HOT WATER HEATERS.

(Continued from page 29.)

out of the expansion tank, and a valve in the other branch comprising a casing having a valve seat therein and a valve adapted to fit the seat, a stem for the valve extending upward through the casing and a weight on the stem.

2. A device for the purpose specified, comprising an expansion tank, a pipe leading to said expansion tank formed with two branches, a check valve in one branch permitting water to flow out of the expansion tank, and a valve in the other branch comprising a casing having a valve seat therein, a rubber fitting in the groove and adapted to fit the valve seat, a stem detachably connected to the valve and extending through the casing, a tubular member surrounding the stem and a weight connected to the top of the stem.

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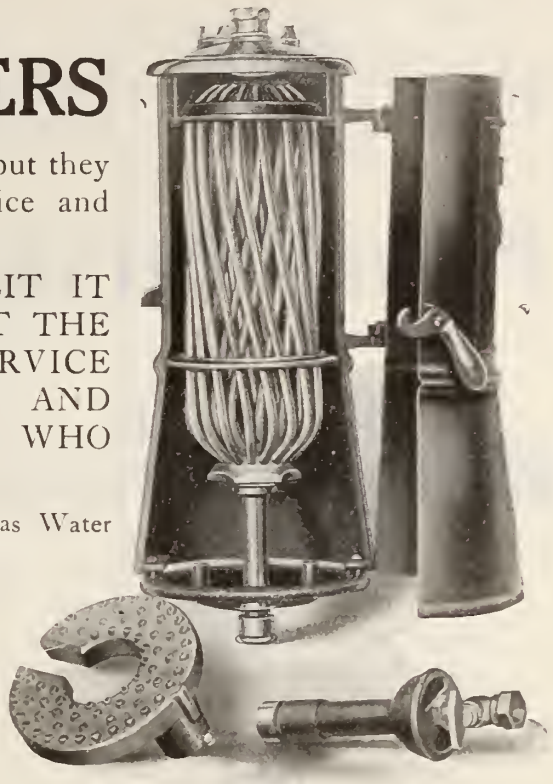

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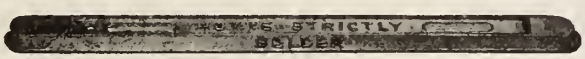

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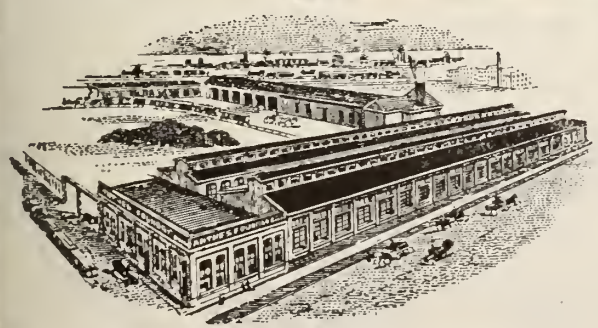

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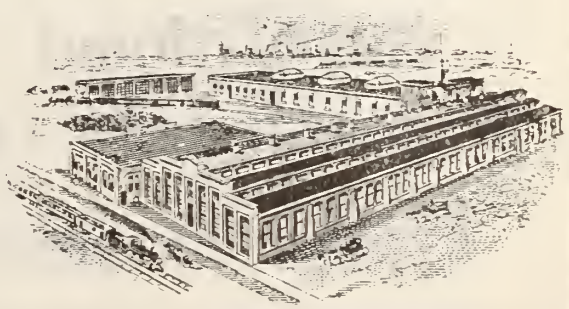

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In a strong article in the February issue of MacLean's Magazine, Elmesley Bartlett brings out a host of interesting facts with reference to Canada's pre-eminence in certain lines. Silver, nickel, asbestos, furs, binders are among the products of the Dominion that are dealt with. Much has been done to bring the name of Canada into the limelight of foreign competition and to establish the possibility of a manufactured product from a "tenderfoot" country winning its place against a phalanx of freight rates, tariffs and prejudice.

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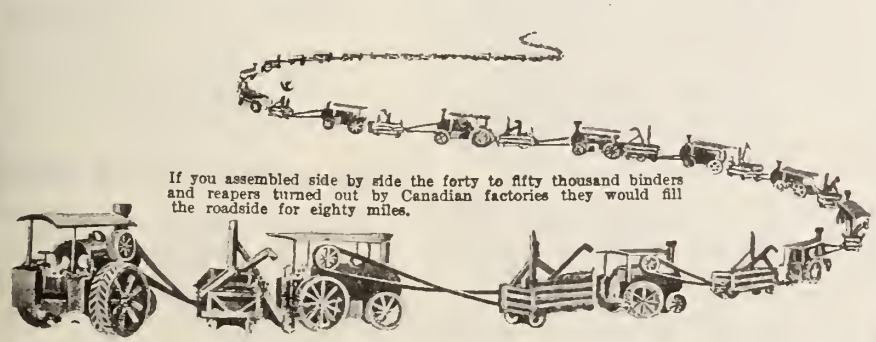

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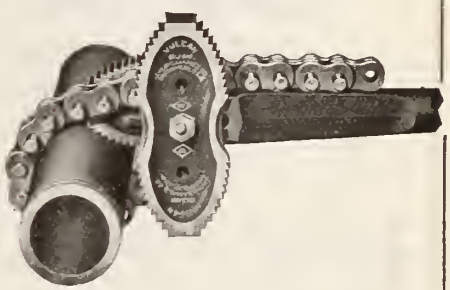

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Warden King, Ltd., Montreal.

Flushometers.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., Ltd., London, Ont.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Co., Ltd., Toronto.
Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
Canadian Wolverine Co., Ltd., Chatham.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Warden King, Ltd., Montreal.

Garbage Burners.
Gurney Foundry Co., Ltd., Toronto.

Gasoline Engines.
National Equipment Co., Ltd., Wabash Avenue, Toronto.

Gas Mantles.
Hamilton Gas Mantle Co., Ltd.

Gas Water Heaters.
Gurney Foundry Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Generators.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
The E. S. Manny Co., Montreal.
Warden King, Ltd., Montreal.

Lead.
Empire Brass Mfg. Co., London.
Hoyt Metal Co., Toronto.
Tallman Brass Mfg. Co., Hamilton.
James Morrison Brass Mfg. Co., Toronto.

Mixing Valves.
Geo. Carpenter, Montreal.
Standard Sanitary Mfg. Co., Toronto.

Nipples.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
C. M. Kemp Mfg. Co., Baltimore.
Empire Brass Mfg. Co., Ltd., London.
Fittings, Limited, Oshawa.
Galt Brass Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallacebnrg Brass Mfg. Co., Wallacebnrg.
Warden King, Ltd., Montreal.

Oil Storage Systems.
National Equipment Co., Ltd., Wabash Avenue, Toronto.

Packing.
Canadian Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
Steel & Radiation, Ltd., Toronto.
Warden, King, Ltd., Montreal.
Steel Co. of Canada, Montreal.
James Morrison Brass Mfg. Co., Toronto.

Pipe Joint Componnds.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.

Pipe Threading and Cutting Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., New Britain, Conn.

Porcelain Ware.
Amherst Foundry Co., Ltd., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope, Ont.
Standard Sanitary Mfg. Co., Ltd., Toronto.

Pumps.
C. A. Dunham & Co., Ltd., Toronto.
National Equipment Co., Toronto.
General Machinery Co., Ltd., Mulock Ave., Toronto.
Cluff Bros., Church St., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Radiators.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn.

Radiator Fittings.
Fittings, Limited, Oshawa.

Radiator Traps (Steam.)
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
C. A. Dunham & Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Septic Tank Valves,
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
National Equipment Co., Ltd., Wabash Ave., Toronto.

Solder.
Hoyt Metal Co., Toronto.

Steam Specialties.
Dart Union Co., Ltd., Toronto.
C. A. Dunham & Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.
The E. S. Manny Co., Montreal.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
E. S. Manny Co., Montreal.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Testing Plugs.
James Morrison Brass Mfg. Co., Toronto.
C. M. Kemp Mfg. Co., Baltimore.

Tools.
Armstrong Mfg. Co., Bridgeport, U.S.A.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tap & Die Co., Ltd.
Hall & Sons, Ltd., Brantford.
Nicholson File Co., Port Hope, Ontario.
James Morrison Brass Mfg. Co., Toronto.
William Johnson, Newark, New Jersey.
Williams, J. H., & Co., Brooklyn, N.Y.

Unions.
Dart Union Co., Ltd., Toronto.
Fittings, Limited, Oshawa.

Vapor Heating Systems.
C. A. Dunham Co., Ltd., Toronto.

Vitro Tanks.
Cluff Bros., Ltd., Church St., Toronto.
Cluff Manufacturing Co., Ltd., Toronto.
James Robertson Co., Ltd., Toronto.

Vacuum Systems of Heating.
C. A. Dunham & Co., Ltd., Toronto.

Water Supply Systems.
National Equipment Co., Ltd., Wabash Avenue, Toronto.
The General Machinery Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.

Get Rid of Surplus Water!

Anywhere and Everywhere

TRADE PENBERTHY MARK.

AUTOMATIC CELLAR DRAINER

Working Parts all above Water **Operated by Water Pressure**

A FEW POINTS OF "SUPERIORITY":

WORKING PARTS ABOVE WATER

Not subject to corrosion or slime, and consequent inoperation.

OCCUPIES MINIMUM SPACE.

Because of patented float design with pipe through centre.

CAN'T FLOOD OR OVERFLOW.

Because of specially designed foot valve located in strainer. A "Penberthy" feature.

WORKMANSHIP AND MATERIAL

Only the very best. Valve opens and closes noiselessly and automatically.

WHAT IT DOES "AUTOMATICALLY":

KEEPS THE PLACE

where installed free from water without attention from anyone.

ELEVATES WATER

from 3 to 18 feet, according to pressure.

REMOVES WATER

in quantities varying from 115 to 6,500 gallons per hour, according to size and conditions.

VALVES AND WASHERS

of entire brass; no leather or springs used. Opens and closes quietly.

MANUFACTURED AND GUARANTEED BY

PENBERTHY INJECTOR CO., LIMITED

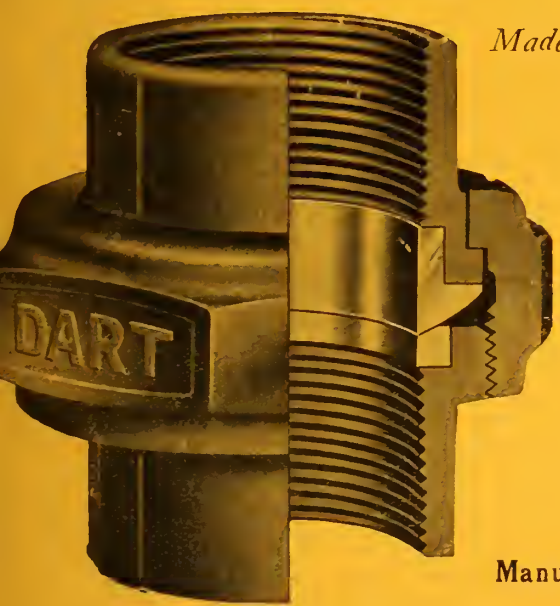
WINDSOR, ONTARIO

Stocked by all the Leading Plumbing Jobbers in Canada

Dart

Union Pipe Couplings

Made in Canada



Bronze to Bronze

Bronze on each face of the joint makes corrosion impossible. The heavy malleable iron pipe ends and nut insure strength and durability.

The Ball-Shaped Seat allows a quickly and easily made connection whether pipes are in or out of line—a joint that NEVER LEAKS unless deliberately loosened with a wrench and which leaves no room for complaints.

Dart Unions are the only product of our factory, so that our whole attention and force is concentrated, which insures a maximum of care and attention to details.

Every Dart Union bears our trade-mark, YOUR GUARANTEE. We will replace 2 for 1, any of these couplings that are not right.

ORDER FROM YOUR JOBBER.

Manufactured by DART UNION CO., LIMITED, TORONTO, Ont.

KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

This plant is at your service.
Help us keep it busy.

REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

Quickest possible deliveries. Consistent Prices.

Best quality of goods. Write for Catalog No. 5.

The Kerr Engine Company, Limited Walkerville, Ontario

Valves and Hydrants Exclusively

YOUR CREED

You believe in Canada. You love her as your home. You honor her institutions. You rejoice in the abundance of her resources. You have unbounded confidence in the ability and enterprise of her people, and you cherish exalted ideas of her destiny among the nations of the world.

You are loyally supporting the *Military Forces* of Canada and the Empire. Will you also support the *Commercial Forces* of Canada by buying Goods that are

"Made in Canada"
By Canadians
For Canadians

?

We ask you to adopt the above as part of your creed when buying Brass Goods.

We ask your support because we know that no Brass Company outside of Canada or in Canada can sell you a better quality than the **"PERFECTO"** line made by

GALT BRASS COMPANY, LIMITED
GALT, CANADA

Trade-Mark
PERFECTO
Registered

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX. Publication Office: TORONTO, FEBRUARY 15, 1915 No. 4

The "INTERCHANGEABLE PANEL" Bath

A High-Class Bath—At A Medium Price

Plate F021
R or L Corner

Plate F022
Recess

Plate F023
End to Wall

Plate F024
Back to Wall

Plate F027
Open

Sizes
5′ and 5½′

Outlet
R or L End

Finish
Tub Enameled
Inside
Panels Enameled Outside

Drilling
Any Style

Distinctive, individual—simple in design, and massive in appearance.

It is the type of bath so generally in demand for high-class installations, where quality and durability are the chief considerations, but where the artistic appearance of the fixture is appreciated also at its true value.

The Standard Ideal Company Limited

General Offices and Factories, Port Hope, Canada

TORONTO	MONTREAL	WINNIPEG	VANCOUVER
119 King St. East	42 Beaver Hall Hill	80 Lombard St.	410 Carter Cotton Bldg.

Beaver Brand
Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

Amherst Foundry Co., Limited

General Offices and Factory: **Amherst, Nova Scotia**

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co.,
178 Victoria St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes,
120 Lombard St., Winnipeg

BRITISH COLUMBIA:
A. O. Campbell,
864 Cambie St., Vancouver

Cast Iron
Pipe Fittings

NOTE THE RECESS

—it eliminates trouble with burred threads and consequent lost time in starting the pipe.

Made from a special semi-steel mixture and designed for strength, appearance and service.

Our specially designed testing apparatus ensures alignment and gauge to an exactness.

Complete satisfaction assured.

SPECIFY "DIAMOND BRAND"

Samples Upon Request.

Made in Canada

Fittings Limited

Oshawa

Montreal Winnipeg Vancouver

War Time is a Good Time

to look around and make **Comparisons** in the material

You Use (Pay US a Visit)

DON'T FORGET

The price on the INVOICE is ALL a B-O-T outfit will cost you, as we live up to our 5-year guarantee to the letter.

Look for the Trade-Mark

The B-O-T Manufacturing Company, Limited

B-O-T Building, 159-61 Richmond Street West, Toronto

Montreal Office:
68 Beaver Hall Hill

Vancouver Agents:
The Robertson-Godson Co.

Winnipeg Office:
J. H. Leonard
405 Tribune Building

TOLEDO AND JARDINE

PIPE THREADING TOOLS

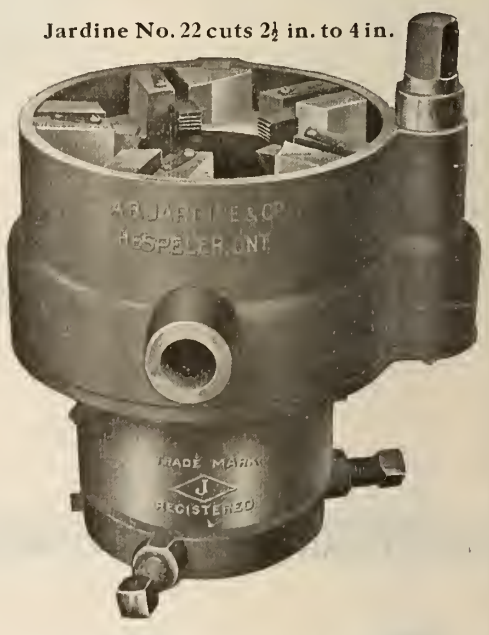
MADE IN CANADA

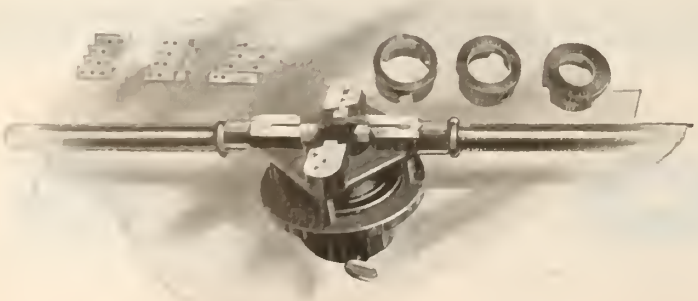
Your Jobber sells them

Perfect threads any size up to 12" finished at one cut by one man.

IT PAYS TO USE THE BEST TOOLS.

Jardine No. 22 cuts 2½ in. to 4 in.





Toledo No. 1 cuts 1 in. to 2 in.

Ask for our new Pipe Die Catalogue.

A. B. JARDINE & CO.

Hespeler, Ontario

Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.
Brockville and East—J. R. Devereux, 142 St. Joseph Boulevard West, Montreal, Que.

THE DAISY BOILER

Over 55,000 DAISY Boilers

are giving the best of service throughout Canada.

The Daisy has qualities which make it a better proposition than any other on the market.

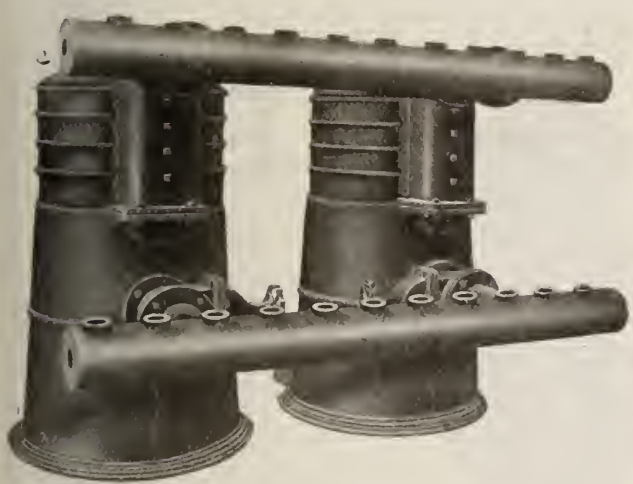
Made in the best equipped plant in Canada.

Without doubt the most popular boiler made.

Every installation means another customer satisfied.

Minimum consumption of fuel.

Maximum amount of heat.



Rear view of two Daisy Boilers connected with twin headers. This system gives great satisfaction in mild and extreme weather.

WARDEN KING LIMITED, MONTREAL

BRANCH, 200 Adelaide St. West, TORONTO

AGENTS:

The CRANE & ORDWAY CO., WINNIPEG, MAN.
The MECHANICS' SUPPLY CO., Limited, QUEBEC, P.Q.
The JAMES ROBERTSON CO., Limited, ST. JOHN, N.B.
The WM. STAIRS, SON & MORROW, Limited, HALIFAX, N.S.

"Saving at the Spigot and Wasting at the Bung"

You note a tendency on the part of many mechanics to get the last bit of wear from a file.

In saving the file—they overlook the time-waste of using an inefficient file.

Because—at a certain point in the life of any file it begins to lose its efficiency. Beyond that point more time is required to do less work. Either the quantity or quality of work—or even both—must suffer. The net loss of time and output far exceed the extra cost of several new files.

This continued use of an inefficient file constitutes a tiny saving in file-cost with a big waste of labor and time. It should be stopped by promptly replacing all worn files, when they reach the "inefficient" point. This point can easily be determined—on your own work—in your own shops. It is very late in the "Famous Five"

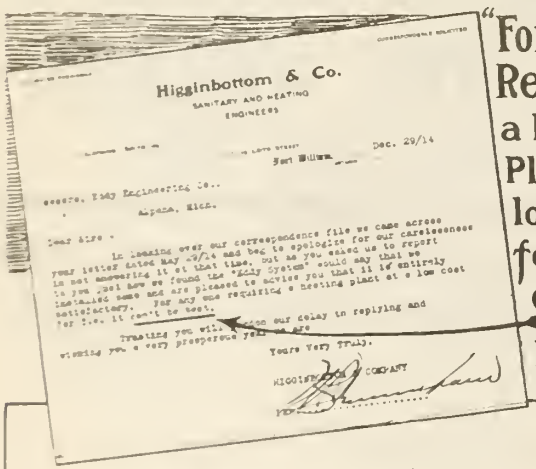
KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Because they are made under exceptionally favorable conditions. 50 years' experience with over 4,000 different types of file—with five great modern plants—with an annual output of 60,000,000 files gives us many advantages in the way of uniform efficiency and economy. The design and development of much specialized file-making machinery and our absolute control of every operation from furnace to file—are vital factors in our holding 90% of Canada's file trade.

A trial of the "Famous Five" in your shops is the best proof of their efficiency we can suggest.

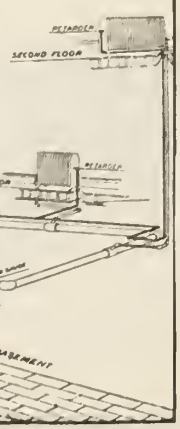
Nicholson File Co. ***Made in Canada*** **Port Hope, Ontario**

A copy of "File Filosophy" sent free on request.


Higginbottom & Co.
SANITARY AND HEATING ENGINEERS
Dec. 29/14
Alpena, Mich.
Dear Sirs:
In looking over our correspondence file we came across your letter dated May 29/14 and beg to apologize for our carelessness in not answering it at that time, but as you stated we to report in case we found the "Eddy System" could say that we installed same and are pleased to advise you that it is entirely satisfactory. For any one requiring a heating plant at a low cost for fuel it can't be beat.
Trusting you will excuse our delay in replying and wishing you a very prosperous year we are
Yours Very Truly,
HIGGINBOTTOM & CO. COMPANY

"For Anyone Requiring a Heating Plant at a low cost for fuel it CAN'T BE BEAT"

THE *Eddy* SYSTEM



Our folder K describes its operation and advantages—write for it.

EDDY ENGINEERING COMPANY
ALPENA, MICH.
U.S.A.

SOMETHING NEW

THE GEYSER AUTOMATIC WATER HEATER

is composed of a vertical cylinder from four to six feet long, according to size. The cylinder contains brass pipes which receive the steam and transmit heat to the water. These pipes are screwed to the base chamber, but remain independent from one another at the top, consequently, the expansion is entirely free, and leaks are impossible.

FULLY GUARANTEED
MANUFACTURED BY
THE E. S. MANNY CO.,
MONTREAL

R. E. Cleaton Co., 20 St. Nicholas Street, Montreal
Sales Agents

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

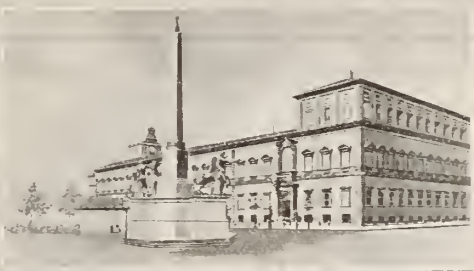
Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND



THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

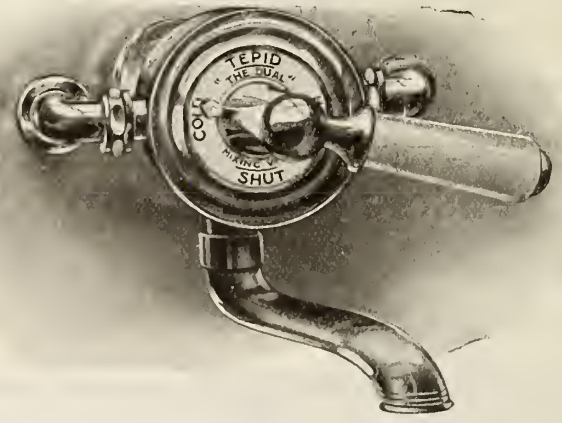
Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal

Messrs.
BRUNNER, MOND & Co., ENGLAND,
Have the finest Industrial Bath Installation in Europe.

OVER 2000 EMPLOYEES
are provided for.
This is the Valve used.
Made in England
by GUMMERS Ltd.,
ROTHERHAM

THE DUAL VALVE
IS THE FINEST MIXER YET PRODUCED



This Mixer is strong and well built.

It can be taken to pieces without disturbing connections. Made in various types for Baths, Lavatories, etc.; also special stock pattern with one or two outlets at option for making up sets.

Send for booklet to

Geo. Carpenter,
314 University St.,
Montreal
Canadian Agent

Talking to the Point—

CLASSIFIED ADS. get right down to the point at issue. If you want something, say so in a few well-chosen words. Readers like that sort of straight-from-the-shoulder-talk, and that is the reason why condensed ads. are so productive of the best kind of results.

CLASSIFIED ADS. are always noticed. They are read by wide-awake, intelligent dealers, who are on the lookout for favorable opportunities to fill their requirements.

TRY A CONDENSED AD. IN THIS PAPER.

"When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."

"CLIMAX" SPECIALTIES

are the result of years of training and experience in this one line of manufacturing.

They are made to work right and give complete satisfaction.

DURABLE

ECONOMICAL

EFFICIENT

"Climax" Cellar Drainer

"CLIMAX" Specialties are Stocked by the Leading Canadian Jobbers.

Long Screw

THE C. M. KEMP MFG. CO.

405-413 E. OLIVER STREET

BALTIMORE, MD.

NOTICE

TO STEAMFITTERS

All steam boilers to be used in the Province of Ontario for heat and power purposes must be constructed from a design registered in the Steam Boiler Branch of the Department of Public Works, and must be accompanied by a certificate issued by the Department showing that the boiler has been built to conform with the Steam Boilers Act. Boilers used in a private residence, apartment house, office building, church, hotel or public building, used exclusively for heating purposes, are exempt provided that they are fitted with a safety valve which has been registered, limiting the pressure carried to fifteen pounds, and having an area figured in accordance with Section 107 of the Regulations.

Plans showing the lay-out of all high pressure steam lines, with valves, etc., must be submitted to the Department for approval in the same manner as boiler designs.

For further information address the Steam Boiler Branch, Department of Public Works, Parliament Buildings, Toronto.

Hon. Finlay G. Macdiarmid, Minister of Public Works.

D. M. Medcalf, Chief Inspector of Steam Boilers.

Mechanical Drawing

By Ervin Kenison, S.B.

Instructor in Mechanical Drawing, Massachusetts Institute of Technology

176 pp., 140 illus. Cloth binding. Gives a course of practical instruction in the art of Mechanical Drawing, based on methods that have stood the test of years of experience. Includes orthographic, isometric and oblique projections, shade lines, intersections and developments, lettering, etc., with abundant exercises and plates.

Price, $1.00

MacLean Publishing Co.

Technical Book Dept.

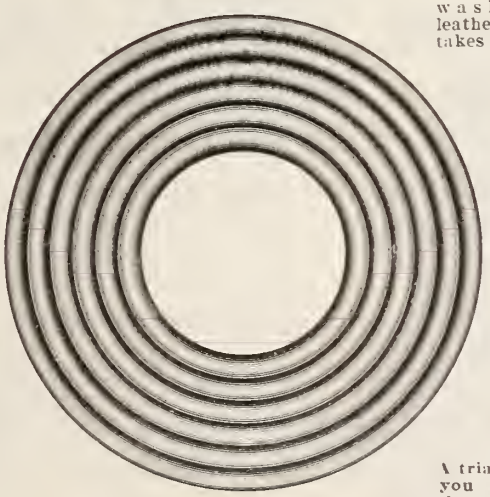
143-149 University Ave., Toronto

You are losing time and money

if you make your own washers when our

COPPER CORRUGATED GASKETS are procurable

TAKE FOR INSTANCE—



when you cut a washer out of leather or rubber it takes about 15 minutes at, say, 1 cent per minute, which means 15 cents, and at the end you have a washer that soon "plays out".

Our Gaskets are used for flanged joints, cylinder heads, unions, steam traps, heaters, etc. They're recommended by best engineers. They last for years. No blowouts.

A trial will convince you that they are the cheapest and best.

THE BEATON & CADWELL MANUFACTURING CO.

New Britain, Conn.

Eastern Agent: J. R. Devereux, 142 St. Joseph Boulevard West, Montreal.
Western Agent: A. E. Hinds & Co., Chamber of Commerce, Winnipeg.

BUSINESS LOGIC!

ADVERTISING is intended to stimulate trade; to establish a connection for the advertiser and make his name well known; to standardize his product and educate the public to an appreciation of its advantages.

¶ If advertising is useful in times of peace, should it not be just as helpful in times of war?

¶ Should not the connection established during a period of commercial prosperity be maintained, even strengthened, until prosperity returns?

¶ Should not the process of familia rizing and educating go on?

¶ If not, why not?

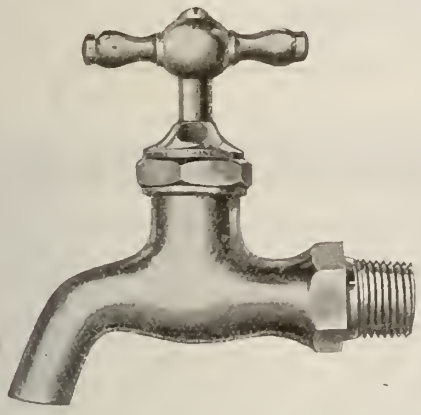
¶ Changes are taking place in the industrial life of Canada. New businesses are coming into existence, some encouraged by the unusual conditions—others undaunted by them. New markets are being opened up. The industrial map of Canada, like the geographical map of Europe, is changing.

¶ The persistent advertiser will keep in touch with his old friends and meet the newcomers. During times of war he will get his share of business and when the war is over his prestige will have been strengthened and his connection enlarged. He will have lost nothing and gained much.

WOLVERINE COMPRESSION BIBBS

Red Brass
Polished or Nickel Plated

GUARANTEED



Furnished with Tee Handle as per cut and with Brass or China Index Lever Handle.

Spout has proper angle to throw the water outward into Dish or Pail, no matter how close to wall or sink back the bibb is installed.

Swivel stem insures long life to washer, as it cannot grind on seat.

Positively the best bibb on the market for the price.

MADE IN CANADA

BY THE

Canadian Wolverine Company, Limited

CHATHAM, ONT.

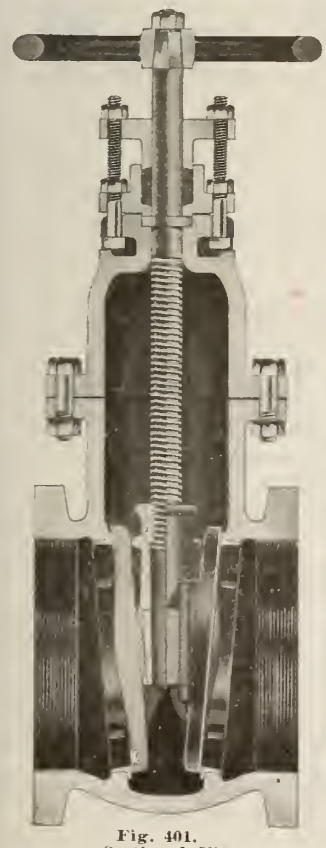


Fig. 401.
Sectional View
Type "K"
Iron Body. Inside Screw.
Gate Valve Screwed.

JENKINS BROS.'
TYPE "K"
IRON BODY GATE VALVES

STANDARD PATTERN

Suitable for working steam pressures up to 125 pounds.

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Fig. 402.
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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, FEBRUARY 15, 1915 No. 4

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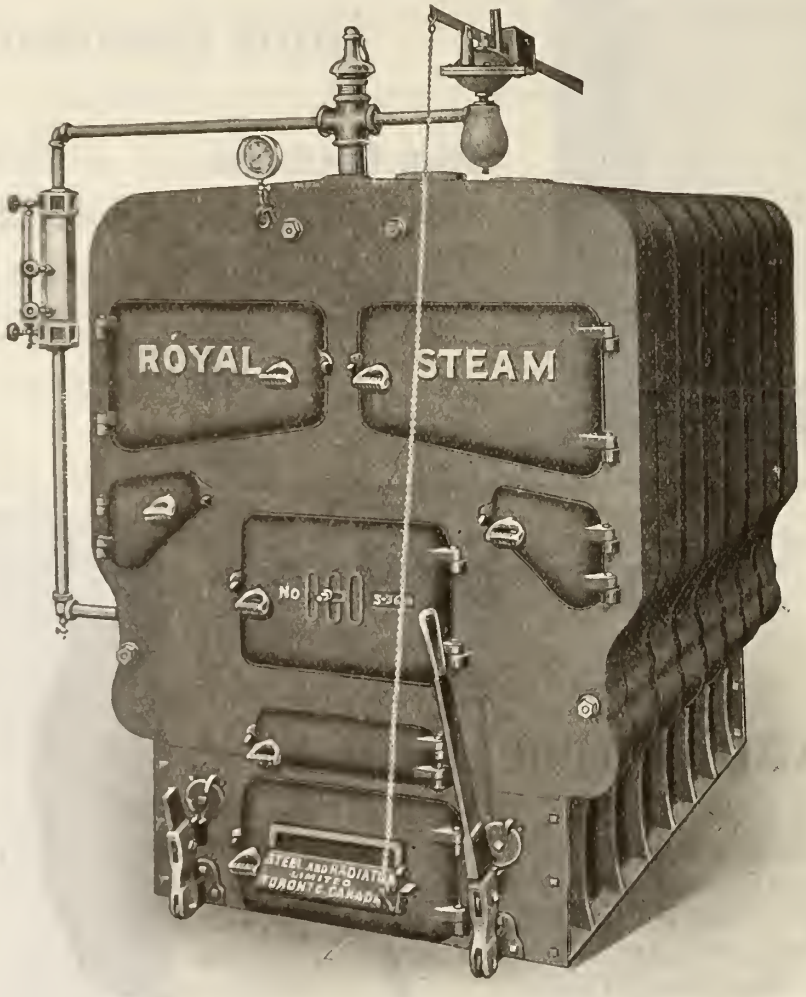

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THE SANITARY ENGINEER

VOL. IX. FEBRUARY 15, 1915. No. 4

Simplified Sanitary Engineering Methods

An Article Read to the Winnipeg and St. Boniface Members of the Canadian Institute of Sanitary Engineers, and Unanimously Endorsed by Them.

Written Jointly by Wm. McFarlane, Secretary Treasurer, and R. J. Thomas, Local Secretary, Winnipeg.

WE have read with interest the articles which have appeared in the Sanitary Engineer under the above heading and we wish to take exception to some of the statements made by Dr. Gerhard. We think it will be conceded by everyone interested in Sanitary Science that the trend of opinion of the leaders in that field at the present day is towards simplicity of construction, but not at the expense of efficiency. We find in studying the history of plumbing that like other things, the problem of treatment and removal of waste water and soil started in the acme of simplicity, with such dire results that the recoil from that resulted in the complicated methods shown in some of the illustrations contained in the above-mentioned articles, which methods may be termed the other extreme. In course of time the pendulum swung back again when the co-called non-siphon traps were introduced and back-venting was eliminated, resulting in dead-ends and easily choked waste pipes owing to the sluggish flow of water through the pipes, which was anything but a sanitary method of dealing with the problem.

However, at the present day, we are striking what we might term the happy medium, although we have to admit that some cities still cling to the old ideas from which it is very hard to shake them, but, we hope that with proper education in the best practice and theory of plumbing that these localities will eventually be brought up to date.

In reading over the articles by Dr. Gerhard, we note that in his arguments and sketches he invariably takes the maximum of simplicity in defence of his opinions, and the maximum of complication when he assumes the offensive, notably in the sketches shown on page 12, Dec. 15th issue, where he omits the safe wastes and local vents in the one and includes them in the other, and as for his contention that there is great danger of by-passing in the complicated methods of venting we consider this a strong argument in favor of examination of plumbers and strict inspection, as with any system incompetent workmen are liable to install work which is dangerous. He says also that venting is a useless outlay of money and increases the number of joints by duplicating the pipe system, thereby increasing the danger of leakages. This only applies to the system of individual venting and we think this is offset by the increased sizes of main waste, soil and vent pipes as advocated by him. Then again his arguments against crown-vents and vents connected to porcelain vent horns do not apply to any modern installation, as both systems mentioned are obsolete. The rapid evaporation of trap seals is also given as an objection to venting, but this contention does not hold if the vents are properly connected on the continuous waste and vent principle, in fact according to tests made by Herr Unna as quoted by Dr. Gerhard a round pipe trap with a seal of 4", which was found to be self-cleansing, will stand unused for ten weeks before the seal is rendered useless by evaporation.

The statement that back-air pipes become closed by frost above the roof, unless enlarged to 4" in diameter, is also applicable to any system of plumbing and in extremely cold climates even this precaution is not always a solution of the difficulty.

We certainly agree with the Doctor when he states that plumbing can and should be skilfully planned and arranged, but as this matter is usually settled by the architect or owner of the building, who in many cases possesses only a slight knowledge of plumbing, the work is very seldom installed to the best advantage. If the plumbers were consulted this objection could often be avoided and long lengths of waste and vent pipes eliminated. A further objection mentioned against back-vent pipes is the excessive friction caused by sharp bends and long lengths of pipe, rendering the pipes useless as a protection against siphonage. This can be done away with by using long sweep bends and increasing the diameter of the pipes. He also argues that in using short branches of soil and waste pipes that these branches are so well flushed with the discharge from modern fixtures with large outlets, which constitute in themselves small flush tanks, that the pipes do not require any other purification or aeration. In the case of water closets of the more modern types the outlets are reduced in area, the better flushing being due to the siphonic action and with regard to other fixtures we fail to see where they are any better in that respect than the older types, and if we are to use the so-called non-siphon trap advocated by him the waste pipe would not be sufficiently cleansed. He, however, admits that a vent pipe is necessary on a long line of waste either with siphon or non-siphon traps, but insists that with short branches this protection is not required. It is not stated what length of branch may be installed unvented and he seems to allow any fixture with a short branch to be placed without a vent irrespective of whether fixtures are connected to the same stack on upper floors.

The following are some of the rules laid down by Dr. Gerhard to ensure an ideal plumbing system:

(1) Always avoid conditions which favor siphonage. This is a strong argument in favor of back-venting .

(2) Soil pipes should not be made too small. Opinions vary on this subject, but he seems to go to extremes in having them made too large, notably in Fig. 92, page 15, of November 2nd issue,

where 5" soil pipe and vent pipe is shown.

(3) Join branch wastes independently to larger waste or soil pipe. This is a good point to consider, but is liable to increase the expense of installation.

(4) Avoid all long dead ends. This is always done in the back-venting system.

(5) Use traps or trap devices which maintain a seal under all ordinary conditions. We fail to agree with him in this, as mechanical attachments of any kind should be avoided under all circumstances and non-siphon traps are not self-cleansing, which should be one of the main requisites of a trap. In fact he admits that non-siphon traps are not fully self-cleansing, but states that all traps should be cleaned out from time to time in any case. In our experience we have found that many "non-siphon" traps after being in use for some time are rendered useless as a protection against siphonage, owing to the interior having become coated with grease, etc., and as for his contention that traps should be cleaned from time to time, we fail to see where this is necessary in the case of round pipe traps. Another great objection to non-siphon traps is that 90 per cent. of them depend for their seal on an interior partition which is liable to corrode through the action of drain air and render the trap a menace to health.

With reference to the various sketches shown in the articles, in the first sketch he shows fixtures on two floors, connected to a 4" stack without vents. According to tests quoted by him no experiments were made with siphon or siphon-jet closets, but results showed that a vent pipe is necessary when the stack is 4" in diameter and we would like to know how many floors he would add before it was considered necessary to install vents, provided there were only single closets with short branches on each floor.

In Fig. 91, is shown a 2" waste stack with a battery of 4 basins on each floor, the laterals being extended full bore in the form of circuit vents to a 2" vent stack, the 1¼" basin branches being taken from laterals and provided with non-siphon traps. We think this arrangement could be much improved by raising the lateral waste pipes and using round pipe or self-cleansing traps connected horizontally to laterals, the vent being taken off between the last two branches as is common practice to-day, thus avoiding any flat vent which is liable to become useless through choking.

Fig. 92 shows an elevation of plumbing such as would be common in a hotel, having two W.C.'s, baths and wash basins on each floor, the soil and vent stacks being 5" in diameter, the laterals being also 5" extended full size to vent stack and the waste branches being 2" extended vertically to fixtures with non-siphon traps under baths and basins. This we consider poor practice as there is about 6 feet of horizontal vent liable to become choked and from the standpoint of expense we think it entails a greater outlay of money than the method used in many cities at the present time.

Figure 95 gives an elevation common to apartment blocks with W.C., bath and basin on each floor, the soil stack being 5", the vent stack 3", the lateral branches being 4" and reduced to 3" after passing the closest fitting and extended in 3" pipe to the vent stack. The bath waste is 2" pipe and has a non-siphon trap, the basin waste is 1½", connected to the vertical branch vent and also has a non-siphon trap. This installation we consider a slight improvement on the previous drawing, as the basin waste would tend to keep the vent pipe clear, but we fail to see the necessity of having a 3" vent pipe nor yet a non-siphon trap under the wash-basin.

Referring to Mr. Newsome's sketches showing batteries of W.C.'s, in Figure 1 he shows a double battery of 5 closets,

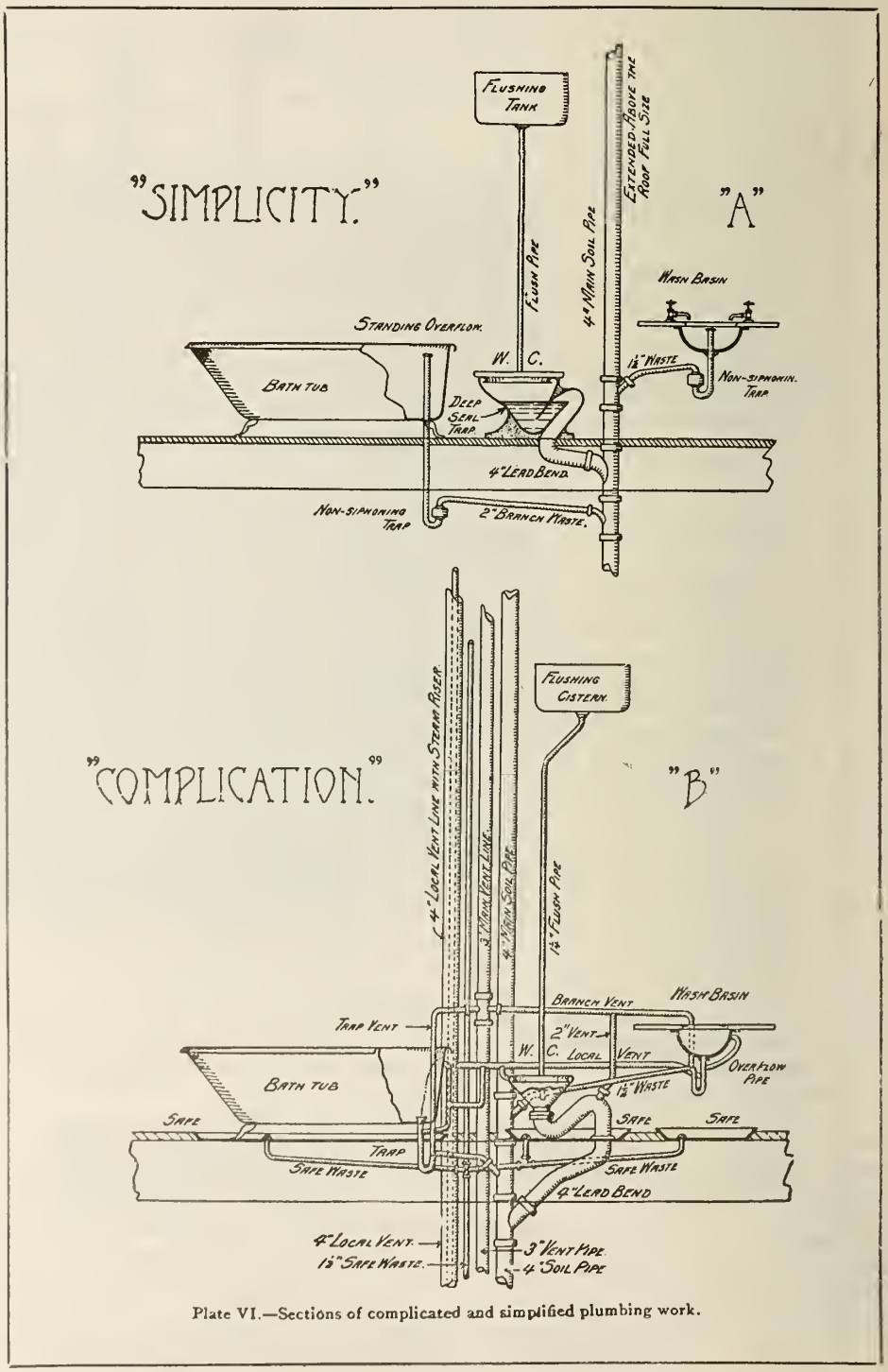
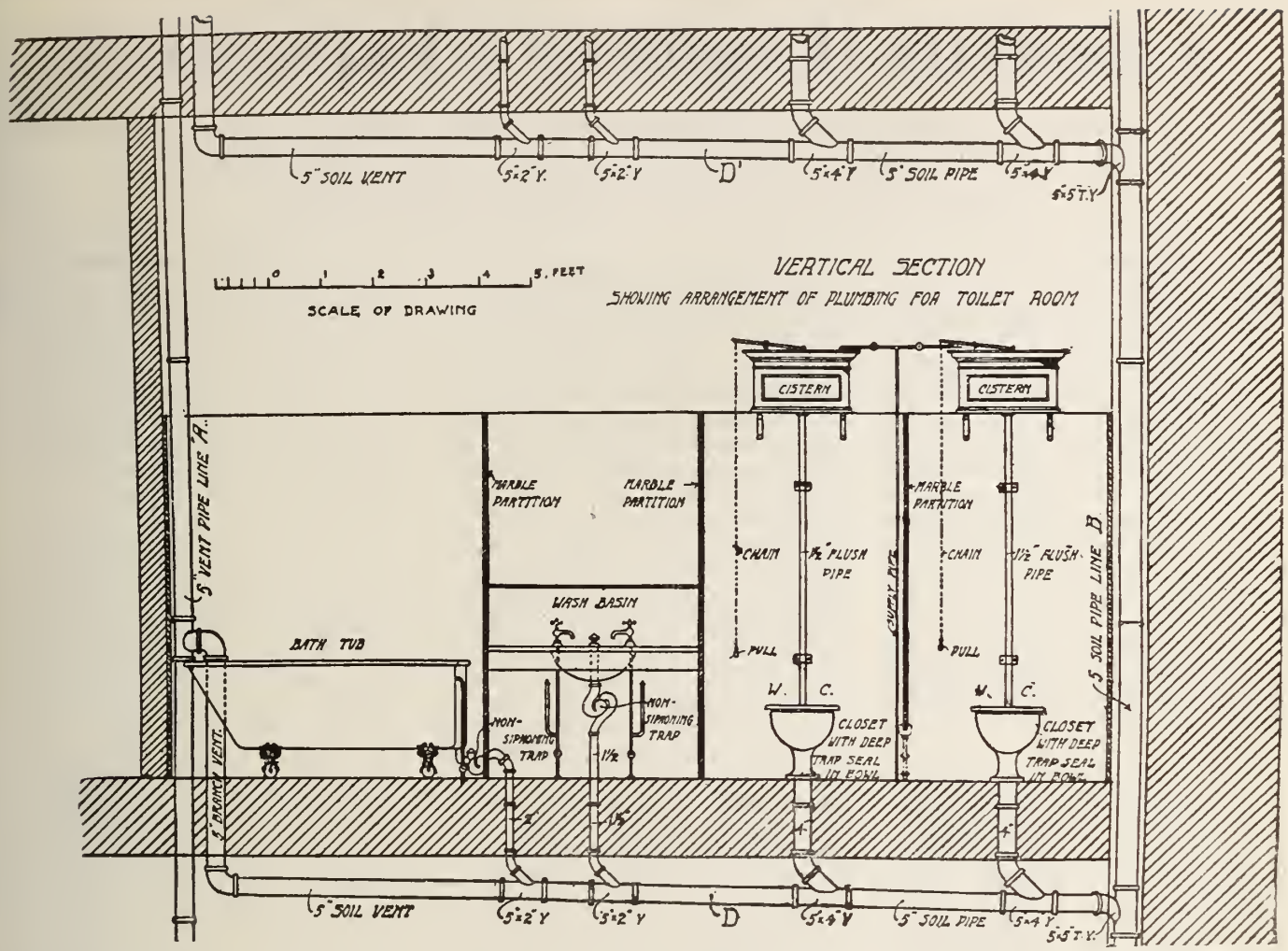


Plate VI.—Sections of complicated and simplified plumbing work.



where the end of lateral is extended horizontally and then vertically as a vent stack, a vent being taken off in front of W.C. branches and connected to vertical vent. Figure 2 shows the same battery with a vent taken from each W.C. branch, extending horizontally to wall and then vertically to a vent pipe, gradually increasing in diameter until it reaches the main stack, which he says is the most popular method in Canada. This may be true in many cities, but in quite a number the method in common practice is somewhat similar to that shown in Fig. 1, but we consider that the proper method is to have the vent breaking off between the last two fixtures fittings with auxiliary vents introduced where there is a large number of fixtures.

To conclude, we might state that all the arguments contained in Dr. Gerhard's articles against the back-venting system are based on the crown vent method which is now obsolete and we are certain the tests made would have had better results if the modern system of

(Continued on page 25.)

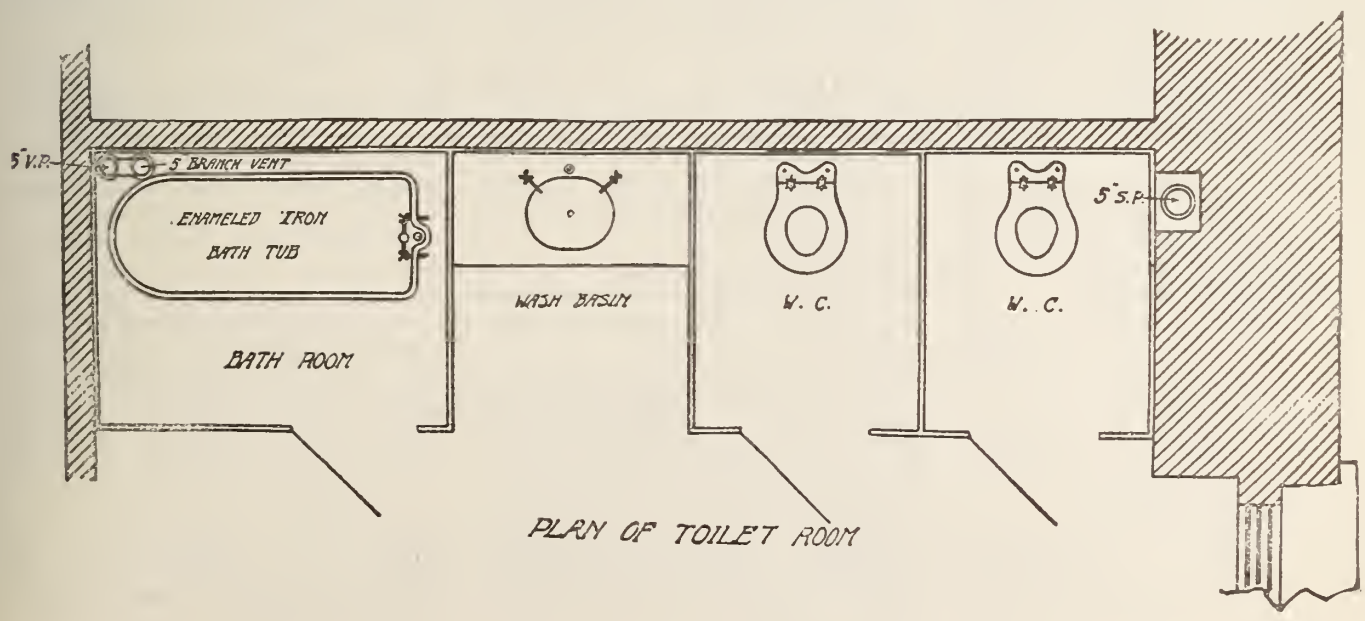


Fig. 93.—Plan of toilet room shown in section in Fig. 92.

A Sanitary Engineer's Experience

A Story Founded on Actual Facts, Showing That if Ever Dame Fortune Knocked at the Door of the Sanitary and Heating Engineer She is Knocking Now.

WRITTEN FOR THE SANITARY ENGINEER BY HUGH S. EAYRS.

MR. JEREMIAH JONES was out of work. Pity 'twas, 'twas true, and Jones did not like it. He had started the year before in business for himself as a sanitary engineer, and for a time he made a living. But the financial stringency—with that peculiar disregard for deserving workers and their work which financial stringencies have ever shown—came along, and it hit the sanitary and heating engineer pretty hard. However, Jones rallied after the first shock, and went hard after business in the town wherein he lived, which we will call Brockleton. But then the war came along, and this time it hit Mr. Jones past the rallying point—or so it seemed to him—and he said to his wife, "Well, I don't know where to look for the next job!"

Mr. Jones said this and continued to say it for some weeks, during which time his expenses went on as of yore. The only thing was that there was nothing coming in to cover them. Thus Jones's savings began to disappear, for in these days the cruse of oil and the barrel of meal do not last for ever. One day, however, Mr. Jones took a long tramp out into the country. Bye and bye he came to a farm, and passed the time of day with the farmer. The farm was a fairly big one, and the farmer was prosperous, as was evidenced by his waist line.

Bye and bye the farmer—whose name was Peter Lander—said he allowed that it was time the cattle were watered. So he went over to the pump which stood over the well, and he filled the trough. Then he shouted to one of the hired men to bring in the cattle to the trough to be watered.

Mr. Jones was standing by, watching. He turned to Mr. Lander and said, "I suppose you have a bathroom and sink and so forth in the house, like most of the well-to farmers have?"

"Bathroom?" said Mr. Lander, slowly, "well, I guess not. We have no bathroom here. We've got a rain tub, and a tin bath and that's good enough."

"But haven't you got a regular bathroom, and a kitchen sink for the wife to wash the dishes in, and a water closet in the house?" said Mr. Jones.

"Say, Mr. Man," came the reply, "what do you think we are? My wife washes the dishes in a dish pan. As for the closet, that's at the top of the garden." "And how do you water the lawn?" said Jones. "Why, with a watering can, what else would yer use?"

"Well," said Jones, "I'd have a pneumatic water system installed. They can be procured to work automatically, and require no attention except a little oil now and then, besides that you don't have to have any tank in the attic and you can get a reduction on your insurance rate too.

Some of Mr. Jones's skeptical friends ought to have heard him talk. Let it never be said that a sanitary engineer cannot wax poetical over the delights of a bathroom and sanitary appliances. Mr. Jones talked to Mr. Lander about the joys of being able to take a bath in a Christian sort of way with an eloquence that astounded Mr. Lander, and sounded strange to Jones himself. He pointed out that an enamel bath is a thing of beauty, and that it would be a joy forever. "Think," said he in an ecstacy of enthusiasm, "think of the delight of being able to have a nice warm bath whenever you want it. Think of the satisfaction that accrues from being able to turn on a tap, and a few minutes later plunge into a hot watered paradise. Just think of the room which you have to stretch your legs in. Everybody knows that a hot bath is one of the few Utopian atmospheres which we are able to enter."

Mr. Lander was beginning to be enthusiastic. "Ah," he murmured.

"And think of the comfort your wife will experience when she can wash the dishes in a civilized sink. What is a dish pan to a wide, roomy sink? Instead of going outside in all sorts of weather and carrying in a bucket of water and heating it over the fire, all that is necessary is to turn on the tap. And think of the cleanliness of it all! No slopping about and splashing the water over the kitchen floor."

Mr. Jones paused. Mr. Lander took off his hat, scratched his head, and said "It certainly would be 'some' improvement."

Mr. Jones knew that well begun was half done. Now he got after Lander's wife. (If you ever tackle a farmer, don't forget to include his wife.) The glowing pictures he painted would have turned anybody's head. The rhapsodizing Mr. Jones did, over a complete sanitary system was something akin to Omar Khayam. "And you see," he concluded, "you have the Hydro current going right past your door. All it needs is connecting up with the house, and a system of pipes installed, and—well, there you are!"

Mr. Lander was there. He asked Mr. Jones to send him an estimate. When it came he accepted it, and Mr. Jones smiled to himself. Then he got busy and he put in a complete sanitary system; a bath with hot and cold water, a water closet, a sink and so forth.

* * *

Nor was that all. It chanced that the man who lived on the next concession to Mr. Lander came to see that gentleman one day. Of course, Lander was enthusiastic about his bath and indoor closet and kitchen sink. He took his neighbor all over the house and chuckled with pride and swelled out his chest as he demonstrated how convenient, how luxurious it all was. The neighbor began to think that he, too, had a pump over a well, and why shouldn't he be as comfortable as Mr. Lander? Result, he asked Mr. Lander for the name of the sanitary engineer. Then he sent for Mr. Jones, and got an estimate, and he, too, had a bathroom, and a water closet and a kitchen sink. And for all I know, every farmer for miles around has them now.

* * *

Now this isn't a fairy tale. It is a fact. It happened not a thousand miles from Toronto. It demonstrates this. The sanitary engineer, if he goes after work among the farmers, has a mighty good chance of getting it. The farmers have a good deal of money these days. With Ontario wheat up to heaven knows where, the farmer is in the seventh Heaven himself. He is making money. The banks will corroborate what I say. Well, why shouldn't they use it to keep business going? They will—if people get after them in the right way.

Mr. Jones found himself pretty well down and out. Orders no longer came to him. But the necessity provided the way to get over it. Jones found he had to get out and hustle. He got out and hustled, and he is making money—more money than he made when he stayed right there in his shop and waited for people to come along and say, "Mr. Jones would you please come and do a job for me."

Right now the sanitary engineer's opportunity is in the farming community. The opportunity of a lifetime must be seized in the lifetime of the opportunity. Why not get out and seize it?

Practical Course for Sheet Metal Workers

Article No. 11 of Series

By CHARLES SEIVERS

TINSHOP COURSE.

IN this article is shown the elevations and plans of a box, the idea being to illustrate the meaning of the terms as usual on plans, etc. An elevation is defined as a side or end view of an object or building drawn without regard to perspective—that is, each part of the object is drawn as though on the same level as point of view. Thus in the front elevation we have the height and length of box shown, on the ends are shown the handles projecting, on the end view are shown the width and height, also the front view of handle; the rear elevation is practically the same in this instance as the front, and the end elevation corresponds with other one, as shown.

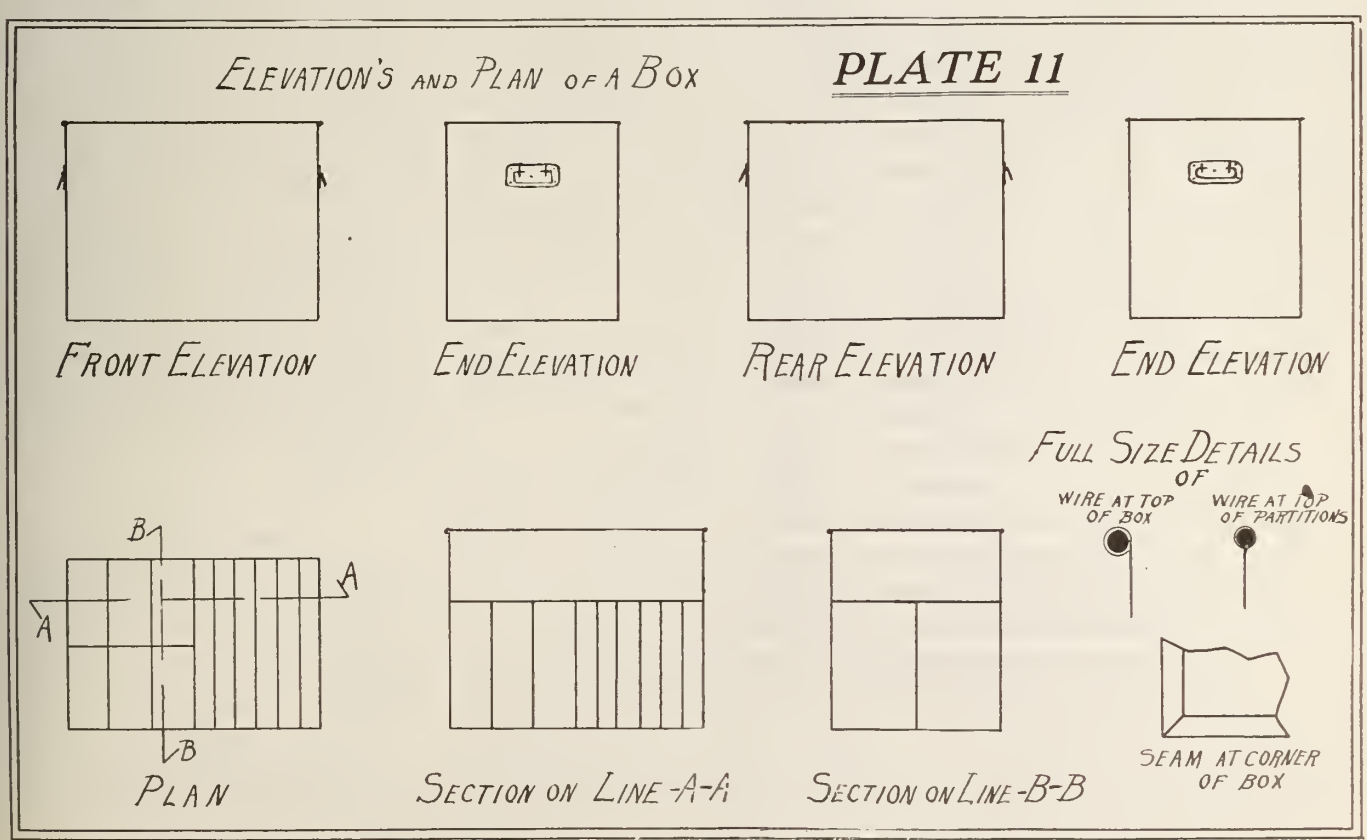
Plan A is defined as a delineation of a building, machine or object on a plane or flat surface. If the plan of a floor in a building were shown, it would show the position of the doors, windows, partition, etc. In this case it shows the space between the partitions to be placed inside the box.

A section is defined as vertical plan of any structure, natural or artificial, as it would appear upon an upright plane cutting through it. In the plan are shown a line A-A and a line B-B. In the drawing, section on line A-A is shown the appearance of the box if it were cut through from top to the bottom on this line. The height of the box is shown, also the height of the partition inside same. In the drawing the sections on line B-B is shown the appearance of the box cut through from top to bottom on line B-B, the total height of box and cross partition being shown. As it would not be possible to draw a large object full size on a plan or elevation, it is drawn to a scale—that is, one portion of a foot on the rule is quoted as being equal to a foot.

*In this instance the scale used being one and one-half inches, equal to one foot, the drawing shows a box three inches long or two foot full size, two inches wide or one foot four inches full size, two and three-eight inches in height or one foot seven inches full size. It quite often occurs in laying out a plan that some particular part is drawn out in full size in order to make the part clear or show method of construction desired. This is illustrated by the full size details shown. One part is full size of wire reinforcing around top of box; another is the reinforcing or finish at top of the partitions; the other shows finished seam at bottom corner of box. In drawing plan of an article, as shown here, it would hardly be necessary to write out a specification or a detailed statement of particulars. These can be noted on drawing, but in large work these are written out, and are used in conjunction with the plans.

**The original drawing of this plate was to scale as described. We would suggest that the student develop the drawing as described, and not as shown in plate.*

The Kerr Turbine Co., Wellsville, N.Y., has appointed W. E. Storey as their Toronto representative, with offices in the Kent Building. Mr. Storey was formerly identified with the Underfeed Stoker Co., and more recently with Goulds Mfg. Co.



The Main House-Trap Question

More Evidence That the Main House-Trap and Breather Should Not be Tolerated and Why Odors From Manholes Become Objectionable—The Main House-Trap Prevents Main Sewers From Being Ventilated.

No question has become more interesting of recent date than that of the main house-trap. We are continually being asked whether the main house-trap should or should not be used.

At the present time there are quite a number of towns and cities that are contemplating re-modelling their plumbing by-laws, and who, therefore, wish to be put right upon the matter. There are two things which should be taken into consideration: First, all sewers should have some form of ventilation, which must be effective and, if possible, non-mechanical.

Second, all sewage should be effectively and quickly carried away from its source into the main sewer.

Every sanitary engineer will admit that sewers should be ventilated, and the most natural way is by means of the house drain and soil pipe and vent stack. Some years ago the public were being scared to death with the fear of sewer gas, which, to be strictly correct, should be termed "sewer air." Now there can be no such thing as sewer gas or air if a sewer is properly ventilated. This air is not dangerous if thoroughly mixed with fresh air, any more than a mild poison would be dangerous if diluted with a large quantity of fresh, pure, wholesome water. There are men to-day working and spending one-third of their lives in the main sewers of London, England, and New York, as well as other large cities. Yet we very seldom hear of their occupation being unhealthy.

Of course, we do not wish to convey to our readers that poison may be taken with impunity if diluted. But if sewer air must be inhaled it certainly should not be inhaled through the open manhole of an unventilated main sewer. Yet this is what is occurring daily in all cities where the use of the main house-trap is enforced.

The worst feature about this system is the danger arising when some infectious disease is prevalent in a neighborhood, and the excreta is allowed to enter the public sewers. These sewers are not ventilated, and the sewer air is escaping through the manhole cover. This air falls to the ground, and is absorbed by dust, the dust is blown around and inhaled, and what is the consequence?

First of all, of course, no excreta from any person afflicted with an infectious disease should be allowed to enter the public sewers. The public should be educated up to that point by the various boards of health. Next, there should always be a suction at every manhole cover; that is what a perforated cover is for. If sewer air is being belched out of these covers it cannot be argued that that is ventilating the sewers. The most effective system of ventilating sewers is through the soil pipe and vent stack. Speaking to an audience comprised of members of the American Association for the Advancement of Science, at Philadelphia, in December last, Dr. Rudolph Hering, consulting engineer and sanitary expert of New York, stated:

"Our wash and bath rooms, toilets, kitchens, laundries, etc., are now supplied with fixtures in such a manner that offensiveness can be entirely excluded. This is done simply by giving them forms and surfaces upon which the dirty water can flow away quickly. No solid particles remain on the surfaces and a final flushing with clean water will restore the receptacles to their condition before use.

"The pipes carrying into the sewers the sewage thus generated should likewise carry it away completely and quickly. The means for accomplishing this are: first, smooth and evenly curved and jointed pipes, and secondly, good currents of air circulation. The former will prevent catching, retention and consequent putrefaction of solid particles; the latter tends to clean up the exposed surfaces, which are otherwise usually covered with slimy growth.

"This air circulation is automatically established by providing openings to the sewer from the street surfaces and opening to the house pipes above the roofs of buildings.

"It was formerly strongly opposed, particularly in England, to have street sewer gas pass up through the pipes to the roof. It was feared that street sewer air might enter rooms through imperfect pipes, or through the fixtures, if their traps were not in order. This opposition is still generally maintained. On the European Continent and in many American cities the ventilation of street sewers through house pipes has, however, been found very advantageous. The house pipes are kept much cleaner, the slimy coating is largely removed, and the escaping air above the roofs is less odorous than when the house pipes are trapped against the street sewer. A careful examination made in this country proves that the escaping air from house pipes above the roofs contained practically no disease germs or other dangerous bacteria."

Dr. Hering has clearly shown that the main house-trap should be a thing of the past, as is the case in all cities where sanitary engineering ordinances are kept up-to-date. The only serious objection to the elimination of the main house-trap is that of a possibility of sewer air entering the rooms of a house through defective joints or unsealed traps. These conditions, however, are practically non-existent, and by right should not happen at all.

Greater care is taken in construction of piping than was the case some years ago. Inspection and tests are more severe than in days gone by; traps where necessary are back-vented, all of which tends to minimize the risk of escaping sewer air.

Then, again, let our readers break the seal of a fixture trap connected with a house drain which has no main trap on it and 99 times out of 100, no matter at what time of the year, it will be found there is a suction on the trap. Do the same, however, with a fixture trap on which there is a main house-trap and note the difference. Of course, the taller the building the greater the suction will be and vice versa. Therefore, with such strong evidence against the use of the main house-trap it is foolish to see a few of the largest towns and cities in Canada still adhering to the old practice of using the main house-trap, particularly when these same cities do not provide any system of ventilation for their main sewers.

NEW BULLETINS.

Water Meter Rates and Regulations.

The above is the title of a new bulletin now being issued by the Buffalo Meter Company. It is full of very useful information, and should be in the possession of every sanitary and heating engineer. This bulletin may be procured free on application to the Buffalo Meter Company, 290 Terrace, Buffalo, N.Y.

The Business Outlook

A Revival Will Result From the Wealth and Prosperity of the Rural Population of Canada, Which Goes to Prove That Money Will be Available for Improvements —Sanitary Engineers Know Full Well That no Improvement Can Create Such Increased Efficiency as Sanitary and Heating Appliances in the Home.

By JOHN APPLETON, Editor of The Financial Post.

WE are now well started on the New Year and the outlook for business is no clearer than it was at the commencement of the war. Anxious eyes are peering into the future. The bank president cannot see very much further than the day laborers, and of the two possibly the latter has the least about which to worry. Everyone has his own cause for some more anxiety than usual. Whether it be the care of a cottage housing a city laborer's family or the conduct of an industrial undertaking upon which the comfort of a thousand homes depend, the duty never has had before it greater uncertainty than that which enshrouds the remainder of the present year.

Happily for Canada this condition applies only to the city—not to the farm laborer or operator. The calamity of war affects Canada adversely, in this instance at least, only in her cities. War costs will, of course, be shared by all but the advantages in the form of higher prices for the products of the farms, all go to the tiller of the soil and the rancher. So long as war continues and its ruthless hands do not interrupt, and there is no possibility of it doing so, the productive operations on Canadian soil there is no doubt but that the rural population of Canada will profit very largely. On this point all authorities seem to agree.

An Accepted Augury of Better Business.

On this central fact the welfare of the various classes that constitute a typical village community depends. There are storekeepers, professional men and others whose services are essential to a rural life. If these communities are healthy and prosperous there need be no fear for the remainder of Canada. The rural population—of the farm and the village or town—is the backbone of the Dominion and always will be. If all is well with this class there can be no real cause for alarm. Our climate is fairly reliable and if during the coming year the weather man sends us but normal weather the farmer will have as much produce to sell as he ever had and he will get more money for it.

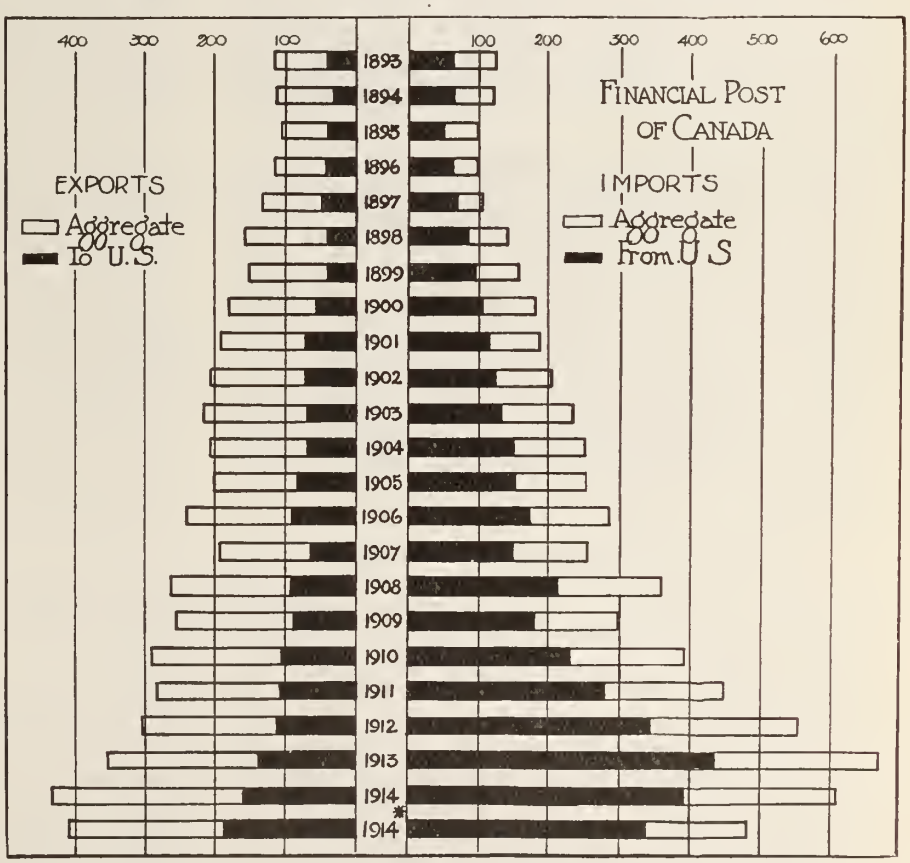
Rural Canada of 1914.

For the last two years the railway builders and the money borrowers, those who have brought to Canada approximately $2,500,000,000, have been anxiously looking to the soil to produce more. We are not pointing this out in a critical sense. The man who homesteaded and lived on the farm has been the most pressing borrower and it is on his behalf that most of the money has been obtained. The distribution of the borrowed money has helped, no doubt, to make business active. The after effects of all the borrowing—many say it is over-borrowing—have been adequately dealt with hitherto and we need not go further into that matter now. At the commencement of the past year the leaders of the nation were urging more production. On the other hand a very large number of brainy and imaginative Canadians were boosting real estate and "blowing" about what could be done rather than of what they were actually doing. This class still enthused by large profits which had been made had not entirely disappeared. But all the "horn blowing" for which the necessary wind could be raised would not induce the wheat to grow or induce more people to come to the land to make good the promise of real estate speculators. Circumstances, and the Kaiser, combined to finally eliminate the speculator and enthroned the idea that to make good real estate had to be used and cultivated.

Purging Effect of City Problems.

When it was the principal commodity of domestic and foreign trade disaster was sure to follow. With 1914 much has gone respecting which Canada need have no regrets. That year, however, gave us

(Continued on page 22.)



*Estimated on basis of returns for the first eight months of current fiscal year.

Exports to United States are steadily increasing, as is shown in the above diagram. The cause of this movement is to be found on the farm. For the 12 months ending October, 1913, the value of live animals exported by Canada was $4,919,677. In the corresponding twelve months ending October, 1914, the value of exported live animals was $13,427,269, of which $13,096,875 went to the United States. That market is a great factor in making the rural districts of Canada as prosperous as any on the continent.

The Sanitary Engineer

Plumber and Steamfitter of Canada

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TORONTO, FEBRUARY 15, 1915

The Business Outlook

SEVERAL inquiries have reached us recently as to the outlook in the sanitary and heating business. From "information received," we do not see any serious grounds for complaint. Of course in making such statement we have not omitted to take into consideration the fact that our country is at war. From what we can learn we are a great deal better off than our neighbors across the line appear to think.

One traveler who had been visiting several U.S. cities told us recently that among business men in some fairly large U.S. towns rumors were current that in many Canadian towns things were so bad that the street cars were not running. As an offset to such fantastic reports, we are reprinting a clipping from the Jan. 30th issue of Financial Post, which reads as follows:

"Some of Canada's industrial institutions have felt the pulse of easier money. From the centres of wealth in the United States enquiries are being made with a view to the investment of money. The bears of some years on the south side of the line now see for the next few years a period of prosperity. They base their hopes upon the abundance of easy money. This they believe will stimulate industry, that easier money is finding its way into Canada. Already it has sought somewhat vigorously our high-class securities, and now it is looking for employment in other lines where the returns are higher. The evidence of this movement is not yet very pronounced, but it is to be found.

All the reports of the financial organizations are of a very optimistic character. Bank presidents and directors are especially so. There is more activity in the stock markets, and security houses are more optimistic generally. Many industries are beginning to take back their men. A pedlar of tea, from house to house, who has a good reputation, says he did a good business in January because many of his customers were getting back to work. Unquestionably the business of the country is being reorganized, and for that purpose "our house has been set in order."

Stocks in wholesale houses are lower, and those in retail stores also. At some of the largest jobbing centres stocks are only 50 per cent. of normal. This condition cannot remain as it is. Meanwhile the people are continuing to avoid incurring liability, and have very appreciably lowered that which accumulated during the years of abnormal expansion.

We can look forward, therefore, to a steady improvement, which will become quicker as a new crop season approaches. For the moment uncertainty as to tariff is acting as a deterrent to business, and is the cause of some speculative buying of commodities."

Cutting Down Expenses

THE way some people go about cutting down expenses is enough to turn 9 out of every 10 sane persons into the most frantic maniacs. Some people do one thing and some another and the latest instance is the news that some city fathers are discharging their plumbing inspectors with a view to cutting down expenses.

Everyone has heard of the boy who killed the goose which laid the golden eggs, but whoever heard of anyone killing the cat to save the milk? That's just about what it amounts to.

When one hears of "firing the plumbing inspector" of course we do not refer to shoemakers, dry goods clerks, carpenters, jacks of NO TRADE and MASTER OF ALL, who are in some towns filling the positions of plumbing inspectors; we mean real, live, practical plumbing inspectors, men with the nose of an A. 1 Mouser for botch work. Men who are doing the greatest service for the smallest remuneration of any practical men in Canada.

Rather than discharge the plumbing inspector, set him to work to examine existing plumbing in buildings which are in use, and have been in use for years. It is the height of absurdity when we remember that 19 out of 20 cities have some sort of a plumbing by-law in force, and all new plumbing or alterations of any note, must, in accordance with such by-law, be tested, inspected and passed by the plumbing inspector. After the premises are once occupied, how often do the inspectors visit those premises again to see how the installations are working, whether the workmanship is holding out, or whether there has been any addition made since the building was first put up? There is every need just now, more than ever, for the services of practical men as plumbing inspector, proof of which we will give in the next issue of The Sanitary Engineer.

Capture the German Trade

WE hear and read a great deal about capturing the German trade. Newspapers are doing a great deal of boosting along that line. But we should not forget what that really means. There is one important feature to be considered which most of the newspapers seem to lose sight of and that is that commerce is based upon the exchange and interchange of commodities. If we are to capture the German trade we must manufacture and export such goods as are required by those upon whom we depend for our imports. We must create a market for such goods as we can export. Underlying this exchange is the financial and credit system. Canadian manufacturers would do well to see what lines of goods are likely to be required by other nations as well as other portions of the British Empire, and in so doing, they may be able to plan accordingly to effect the much-talked-of captures.

Bank Savings

DOES any person imagine that because purchasing has been curtailed that fundamentally conditions are not sound in Canada? Does anyone imagine that the falling-off in many centres of retail buying signified just that much depletion in the "surplus" of the public? Official returns show that *savings deposits in Canadian chartered banks were greater at the close of* 1914 *than at any time in Canada's financial history* — $665,000,000 *on Dec.* 31, 1914, *compared with* $626,000,000 *on Dec.* 31, 1913, *and* $625,000,000 *on Dec.* 31, 1912. In round figures this goes to show that there is an increase in savings bank deposits to the extent of $39,000,000 from Dec. 31, 1913, to Dec. 31, 1914.

Now who are the people that have effected this saving? It certainly has not been from the savings of the industrial workers, for the simple reason that for the past year this class have on the whole been working short time and could not possibly put money aside. It must be the farmer, or those interested in agriculture. Not only so, but despite the fact, reports are current throughout different parts of Canada that farmers are holding their grain for higher prices. If such is an actual fact, the farmers are better off throughout Canada this year to the extent of $39,000,000, plus all the grain which is being held back, of the value of the latter no one could attempt to give the faintest idea. We have dwelt upon the subject of the farmer and his wealth more in this issue than any other issue of The Sanitary Engineer ever published, and the reason for our so doing is that we wished to impress upon our readers how fertile a field for new business the farmer is to the sanitary and heating engineer. The farmer has the money but has not the comforts of the city dweller. Why should he not have these comforts when he can better afford them than any other person in Canada?

The farmers' sons and daughters are being sent to our cities to become educated. They appreciate the comfort and conveniences of the modern city home and when they return to their parental roof they still desire the city comforts, and failing them they are uncomfortable. They begin to look upon home as unsanitary, etc., etc., and a thousand and one things come into their minds which make them hanker after the city life and its conveniences. Sanitary and heating engineers can do a lot towards keeping the young folk on the farm as well as create new business for themselves.

Business Success

No matter how this old world goes
Keep a-smiling.
If competitors tramp hard on your toes
Keep a-smiling.
For half the battle is in the grin
Stick to it boys, you're sure to win,
No matter if times pinch like sin,
Just keep on smiling.

The Business World is a mirror true,
Keep a-smiling.
Your cheer in trade reflects on you.
So keep smiling.
Customers are never won by grouch:
Keep your woes down in your pouch.
If your plans strike a cold wave douche,
Just keep on smiling.

A smile is oil to the wheels of life,
Keep a-smiling.
In the midst of your business strife
Keep a-smiling.
Meet each new day with a happy song,
T'will help to boom your work along,
Your cheer will make for business strong,
So keep on smiling.

—*Eva E. Hamilton.*

ENTHUSIASM

Enthusiasm is the greatest business asset in the world. It beats money and power and influence. Single-handed, the enthusiast convinces and dominates where the wealth accumulated by a small army of workers would scarcely raise a tremor of interest. Enthusiasm tramples over prejudice and opposition, spurns inaction, storms the citadel of its object and, like an avalanche, overwhelms and engulfs all obstacles. Faith and initiative rightly combined remove mountainous barriers and achieve the unheard of and miraculous. Set the germ of enthusiasm afloat in your plant, in your office or on your farm; carry it in your attitude and manner; it spreads like contagion and influences every fiber of your industry before you realize it; it begets and inspires effects you did not dream of; it means increase in production and decrease in costs; it means joy and pleasure and satisfaction to your workers; it means life, real and virile; it means spontaneous bedrock results—the vital thing that pay dividends.

THE BUSINESS OUTLOOK.

(Continued from page 19.)

the lesson of production which will be the great asset it left for the nation. For years the cities have been robbing the villages of the talent and the energy that was needed on the soil. To-day the problems of the city are driving back to the land men and capital. Attempts are being made to hold the unemployed in the cities by "making" work for them. It is a fundamental error for which the nation will have to pay. The greater the pressure to get men back to the land the better it will be for the nation—and for business.

The Fortunate Farmer.

Although we had war, financial paralysis and collapse during 1914, the rural districts of the Dominion were not affected except in well defined districts that were unfortunate in respect of the weather. Farmers got more for their produce than usual; they paid their debts as well or better than usual and look upon another year as having prospects for their material welfare better than those which faced them a year ago. The harvest of 1913 was bountiful but the price was low and it had a sobering effect. A check was given to buying unnecessaries. That year, as well as 1914, were characterized by the liquidation of much debt. At the close of the latter, a week or two ago, the farmers were in the position of having economized, perforce, to a very large extent, for about two years during which they "nibbled" at their liability which now forms a smaller ratio of the wealth they now possess. Since the declaration of war still greater care and economy has been exercised. Under the circumstances it is no wonder complaint with regard to the way in which their liabilities have been taken care of is of rare occurrence.

What we have said applies to Canada taken as a whole. In the West the conditions, generally, have not been quite as favorable as in other portions. The crop failed in limited districts so completely as to necessitate the action of the Government on behalf of the suffering farmers.

Speaking generally, however, the farmers have been economical now for two years; they have paid off much of their liability and their wealth is greater than ever. This attitude has resulted in quieter business for the tradesmen and in general trade contraction. But we cannot attribute to the farmer responsibility for all our trade contraction. By far the greater proportion is due to the cessation of large capital expenditures in the form of railway building and other large enterprises. That part of our domestic trade which originates and is sustained as a rule by the farmer is the steadiest and the most reliable. In the earlier months of the present year it will be found that many failures will take place, but they will not be due to an extent appreciably exceeding normal, to the delinquencies of the rural consumer, or impairment of his purchasing power. His wants constituted the most normal element in trade during last year and his wants during the ensuing year will be, if present prospects hold, larger than usual and will in our opinion result in setting in motion some of the present idle wheels of industry.

Rural Canada of 1915.

Starting the New Year we find the rural districts of Canada in a position that they have not hitherto faced. At no time have the chances of higher prices for every kind of farm product been better. It is all very well to talk of prospects but what are the foundations of our belief in this? It is patent to everyone that millions of men usually employed in producing more than they consume are now engaged in destroying much and consuming more than usual. This will create a great void for the very products for which Canadian soil is best fitted to produce and at no time in Canadian history has the producer been better equipped to produce. Not only is the market in Europe offering greater demands than usual but the gates are open wide to a market on this continent. The United States is taking our produce to a greater extent every year. The accompanying diagram which was prepared by The Financial Post shows the trend of our exports to the United States, and it should be remembered that the exports are those originating on the farm. Out of a total of $13,427,269 in living animals exported for the twelve months ending October last, the United States took $13,096,875. These figures together with some others are reproduced herewith to show how rapidly our trade with the republic to the south is growing and it is the farm that is at the root of this growth.

EDITOR'S NOTE.—Mr. Appleton accentuates the fact that the outlook for the rural population of Canada is very bright and that trade with it should be better in 1915 *than in* 1914. *In view of the great void being created for all kinds of farm produce through devastation in Europe, and the employment of millions in consuming and destroying in place of producing, the demand for Canadian products will be heavy, with results that will stimulate business. Not only will the demand from Europe be heavy but that from the States will not be negligible as our neighbors will not have a bumper crop every year.*

Knowing that the farmer is to receive the returns for his crops, that there has been more wheat sown already than ever before in the history of this country. It can easily be seen that once convinced of the necessity for sanitary conveniences, and shown how these can be had, the farmer cannot fail to see and realize the comforts he can enjoy by investing his money in sanitary and heating installations.

Farm Produce and Fish and the Amount Sold to U. S.

	1913.	1914.	To U.S. 1914.
Animals, living	$ 4,919,677	$ 13,427,269	$13,096,875
Breadstuffs	150,797,726	139,558,811	14,460,203
Fish	18,638,513	18,781,072	7,583,241
Hay	1,821,498	2,140,522	1,353,552
Hides	8,359,700	8,442,660	8,412,434

As our business depends fundamentally upon the farmer we have no reason to be gloomy with respect to the future. Facts tell us, beyond question, that for our produce during the past year we have received more than usual and the prospect is that, for a very much larger production, during the current year the farmers will obtain more than they did in the past year. If there is any real distress in the country, or any class of business that is suffering it is because it has not been built upon sound foundations. That being the case it is to the advantage of Canada that it should at this time crumble and pass away and leave the land purged of what is not fit to live.

For all the operations on our farms there is every prospect of the banks of the country having all the necessary funds. For the moving of actual produce for which there is a real demand there will be no doubt as to the financing. During the last week of December last the Government statement covering the operations of the chartered banks of the Dominion for the month of November was issued and it disclosed a state of affairs that was indicative of steadiness, and which was re-assuring. Deposits by the public were shown to be on the increase and correspondingly commercial loans contracted. The latter movement is not unusual at that period of the year. For every dollar the public had on deposit with the banks seventy-nine cents were out on loans. Usually the amount out on loans is eighty-four cents or thereabouts out of every dollar. Never before has the ratio of loans to deposits been so low. Another fact worthy of note in connection with the bank statement is that the aggregate of actual cash in the till, the amount due to banks from their correspondents abroad, and Government securities were very much larger at the end of November than it has ever been before. We may take it from these facts that the banks are in a

(Continued on page 23.)

Notice to Readers.

We understand that quite a number of sanitary and heating engineers have volunteered their services for the front. Any information as to any members of the craft joining the Militia for active service or the Home Guards will be greatly appreciated.

Off to the Front.

Harvey Brown, of Kelowna, B.C., writes us that he has joined the Militia, and expects to go to the front. Mr. Brown is one of our readers, and at the time of writing was in training at Willows Camp, Victoria, B.C. We wish him God-speed and a safe return.

Best of Health in N. B.

The secretary of the Provincial Board of Health reports that the general health of the Province of New Brunswick was never better than it is to-day. There was not a single case of small-pox in the whole Province last year, and epidemics of any kind were less in number than any previous year.

Plumbing Inspector for Chatham.

At a recent meeting of the Board of Health, Chatham, Ont., R. McG. Coyle, sanitary engineer, who has been appointed a member of the board, was instrumental in having a resolution passed requesting the city council to appoint a plumbing inspector for the city. The appointment of a plumbing inspector has been agitated for in Chatham on several occasions, but so far without avail. Mr. Coyle gave a number of instances of decidedly defective plumbing in support of his request for the appointment of an inspector.

The Peterboro Plumbers Cannot Do Any Business in Lindsay?

Mr. George Trenton, of Peterboro, had to appear before P. M. Jackson recently to answer to a charge of violating town by-law No. 869, which does not permit an outside plumber doing work in Lindsay. The charge was preferred against him by Inspector R. Douglas.

One clause in the by-law reads that any plumber who shall not have a place of business in town, or who does not have a residence therein, cannot undertake such work.

Mr. Trenton was engaged on a building being erected by Mr. James Bogue.

Officials Appointed for the Prince Edward Island Society.

Charlottetown, P.E.I., Jan. 30, 1915.—At the annual meeting of the P.E.I. Society of Domestic Sanitary and Heating Engineers the following members were elected to comprise the executive board for the year 1915:—President, Thomas Johnson, Summerside, P.E.I.; vice-president, James A. McEachern, Charlottetown, P.E.I.; secretary-treasurer, John F. Murnaghan, Charlottetown, P.E.I.

Ontario Society Annual Convention.

A meeting of the directors of the Ontario Society of Domestic, Sanitary and Heating Engineers took place Feb. 8th, 1915, at their headquarters, Canadian Foresters Hall, 22 College St., Toronto, when it was decided to hold the fourth annual convention of the society at the above address on Thursday, Friday and Saturday, the 22nd, 23rd and 24th days of April, 1915. Further particulars will be published in this paper at a later date.

Visits the Sanitary Engineer.

It does a fellow good to meet one of his fellow craftsmen now and again and talk shop. Such was the experience of The Sanitary Engineer the other day when R. A. Shaw, sanitary and heating engineer of Port Arthur paid us a visit. We welcome all comers from near or far who are interested in the general welfare of the craft. Mr. Shaw is a man who while not in the business for nothing, is prepared to give everybody a square deal, himself included.

There are those who are in the business for all there is in it for themselves only. Such men have dragged the business down to anything but a creditable level. There are also some who have tried to give the public more than is their due. Both are dishonest, and can not succeed. Therefore we wish brother Shaw good-luck as well as all who have included themselves when handing out square deals.

Can't Do Without Inspector.

With the object of retaining the services of Geo. Taylor, plumbing inspector for the city of Saskatoon, a committee from the Builders' Exchange of that city waited upon the commissioners recently to discuss with them the estimates for the year. A sum of $1,997 is provided with which to carry on the work of the building and plumbing inspector's departments, and the directors of the Builders' Exchange, learning that it was the plan of the Commissioners to dispense with the services of Mr. Taylor, whose work it was planned could be done by the building inspector, resolved at a meeting held last Saturday to suggest a plan whereby the services of Mr. Taylor could be retained. The suggestion made to the commissioners provided for the estimates being increased to $2,000, and Mr. Harrison and Mr. Taylor being retained at salaries of $1,000 each. It was stated by members of the deputation that both Mr. Harrison and Mr. Taylor had been approached and had stated their willingness to accept the remuneration suggested. It was argued that Mr. Harrison was not qualified to act as plumbing inspector any more than Mr. Taylor was qualified to be building inspector; that both men had been faithful employees of the city, and were both entitled to consideration. No action was taken by the commissioners nor promises made pending interviews with Mr. Harrison and Mr. Taylor.

THE BUSINESS OUTLOOK.

(Continued from page 22.)

position to take care of the legitimate commercial needs of the country during the year. One thing is sure the movement of any kind of merchandise will be facilitated.

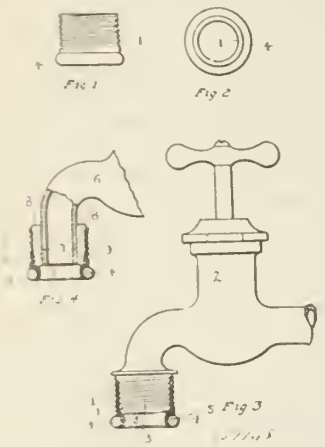
The chief thing is that more wealth is being produced than is being consumed. That appears to be the position in Canada to-day. Undoubtedly the result will be more business in due course. If the producers are busy we cannot but think that even the industrial conditions in Canada will very soon right themselves. Meanwhile the village store, or any store that has business with the farmer and the producer need not worry as to business during the year. The prospect is that the demands from rural Canada will be quiet normal before the close of the present year.

New Canadian Patents

No. 159,148.

Louis A. Cornelius, Grand Rapids, Michigan, U.S.A., 24th November, 1914; 6 years. Filed 24th July, 1914. Receipt No. 241,559.

Claim.—In a device of the character described, a tube adapted to be secured to the faucet's nozzle and having on its internal wall a shoulder and a packing member carried on the shoulder, and having on its exterior wall an annular groove and an annular buffer held in the groove,



Faucet Guard.

the portion of the tube which forms the shoulder on the inside forming also a portion of the groove on the outside.

* * *

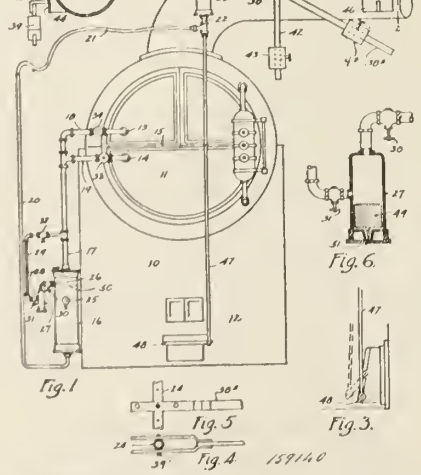
No. 159,140.

Isaac Alfred Backlund, Spokane, Washington, U.S.A., 24th November, 1914; 6 years. Filed 30th September, 1913. Receipt No. 229,537.

Claim.—1. In a draft regulator for steam boilers, a damper in the smokestack having a horizontally arranged shaft, an actuating lever mounted on said shaft with a tank supported on one end thereof at a position above the boiler, and a counterbalance on the other end, a tank subjacent to the boiler with a conduit connected at its upper end, such conduit having two branches, one reaching to the water and the other to the steam area of the boiler, a conduit connected at the lower end of such tank reaching to a flexible conduit joining a conduit leading to the inner area of the tank above the boiler, and means for cutting off separately the connection between the subjacent tank and the water and steam areas respectively of the boiler.

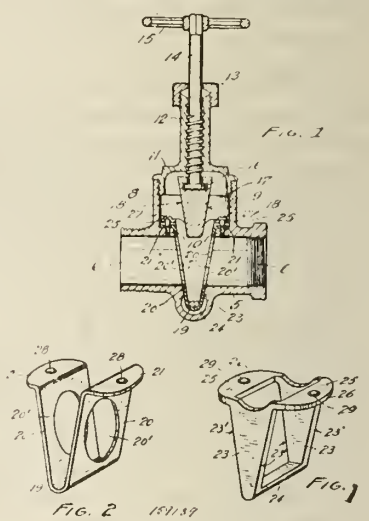
2. In a draft regulator for steam boilers, a damper in the smokestack having a horizontally arranged shaft, an actuating lever mounted on said shaft with a tank supported on one end thereof at a position above the boiler, and a counterbalance on the other end, a tank subjacent to the boiler with a conduit connected at its upper end, such conduit having two branches, one reaching to the water and the other to the steam area of the boiler, a conduit connected at the lower end of such tank reaching to a flexible conduit joining a conduit leading to the inner area of the tank above the boiler, and means for cutting off separately the connection between the subjacent tank and the water and steam areas respectively of the boiler, together with means for regulating the liquid line in the subjacent tank.

3. In a draft regulator for steam boilers, a damper in the smokestack having a horizontally arranged shaft, an actuating lever mounted on said shaft with a tank supported on one end thereof at a position above the boiler, and a counterbalance on the other end, a tank subjacent to the boiler with a conduit connected at its upper end, such conduit having two branches, one reaching to the water and the other to the steam area of the boiler, a conduit connected at the lower end of such tank reaching to a flexible conduit joining a conduit leading to the inner area of the tank above the boiler, and means for cutting off separately the connection between the subjacent tank and the water and steam areas respectively of the boiler, together with a waste valve attached to the subjacent tank, and a conduit connection between the waste valve and the conduit leading from the top of the subjacent tank to the steam and water areas of the boiler.



Draft Regulator for Steam Boilers.

4. In a draft regulator for steam boilers, a damper in the smokestack having a horizontally arranged shaft, an actuating lever mounted on said shaft with a tank supported on one end thereof at a position above the boiler, and a counterbalance on the other end, a tank subjacent to the boiler with a conduit connected at its upper end, such conduit having two branches, one reaching to the water and the other to the steam area of the boiler, a conduit connected at the lower end of such tank reaching to a flexible conduit joining a conduit leading to the inner area of the tank above the boiler, and means for cutting off separately the connection between the subjacent tank and the water and steam areas respectively of the boiler, together with a waste valve attached to the subjacent tank, and a conduit connection between the waste valve and the conduit leading from the top of the subjacent tank to the steam and water areas of the boiler, and means for draining the subjacent tank.



Gate Valve.

* * *

No. 159,139.

Charles P. Anderson, Seattle, Washington, U.S.A., 24th November, 1914; 6 years. Filed 27th July, 1914. Receipt No. 241,659.

Claim.—A gate valve having a liner provided with opposing ports which are arranged to respectively register with both the inlet and outlet passages of the valve body, a frame member adapted to be adjusted to stretch said liner and be

subsequently fastened to the valve body for securing the liner thereto.

2. In a gate valve, the combination with the valve body having a chamber with inclined opposing walls and provided with shelves at the upper ends of the latter, of a substantially V-shaped liner having terminal flaps, a frame member comprising V-shaped side elements, a bar connecting the lower ends of the side elements, plate elements connecting the upper ends of the respective side elements, and screws extending through the adjacent plate elements and the flaps for securing the liner at the top to the valve body, said side elements serving to hold the liner about its lateral edges to the aforesaid walls.

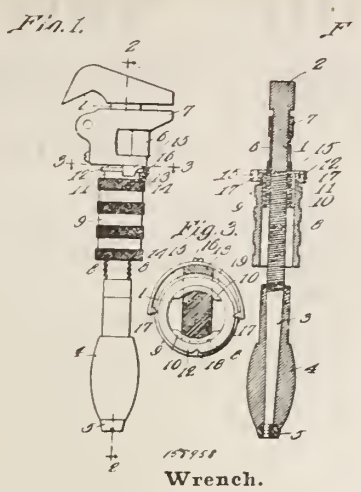
3. In a gate valve, the combination of a valve body formed with a chamber having inclined opposing walls, a substantially V-shaped liner for said walls, a frame member, and means for securing said frame member to the valve body for securing said liner to the latter, said frame member also serving to clamp the liner about its lateral edges to the aforesaid walls.

* * *

No. 159,085.

Steven Toth, Los Angeles, U.S.A., 17th November, 1914; 6 years. Filed 19th August, 1914. Receipt No. 242,437.

Claim.—A wrench comprising an outer jaw member having a shank provided with teeth and an inner jaw member having a shank offset therefrom and extending at right angles to said jaw member and provided with a slot in the offset portion for receiving the shank on the outer jaw member, said inner jaw member and its shank being formed as an integral member, a face plate removably secured to said inner jaw member and provided with a straight face opposing the inner face of the outer jaw member, and a dog lever pivotally mounted on said inner jaw member within the slot thereof, and having one arm adapted to engage said teeth on said shank to hold the jaw members in set position and serve as a fulcrum, and said dog lever having another arm extending oppositely from said first-named arm and projecting outside of the slot of the jaw member to enable the dog lever to be released from said teeth by pressure on said projecting portion, a spring between said second arm of the dog lever and the inner jaw member for holding the first arm of the dog lever into engagement with the said teeth, said shank on the inner jaw member being channelled to partly enclose the said shank in the outer jaw member, and said shank on the outer member projecting from the channel in the shank of the inner jaw member when the shanks are closed on



Wrench.

one another, and a spring between the shanks of said jaw members, tending to spread the shanks apart.

* * *

No. 159,022.

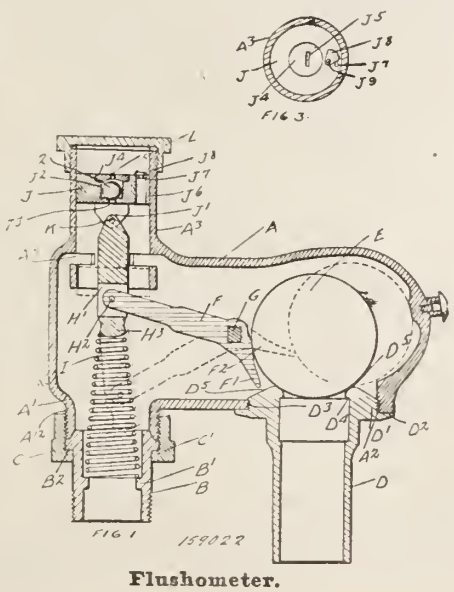
William Alexander Fraser, Toronto, Ontario, Canada, 17th November, 1914; 6 years. Filed 14th May, 1914. Receipt No. 238,691.

Claim.—1. In a flushometer, the combination with the casing and dash-pot, and piston end piston rod connected to the means operating the valve, of a downwardly extending dash-pot extension within which the piston works provided with a port below which the piston is brought when the valve is removed from its seat, as and for the purpose specified.

2.—The combination with the casing and ball and the flow orifice at one end of the bottom thereof having a cone frustum-shaped seat for the ball, and an inlet orifice at the opposite end of the bottom of the casing, of a lever suitably fulcrumed in the casing and provided with a depending portion designed to operate against the ball, a piston operatively connected to the opposite end of the lever and provided with a suitable relief orifice and a dash-pot within which the piston works provided with a suitable cap, as and for the purpose specified.

3. The combination with the casing and ball and the flow orifice at one end of the bottom thereof having a cone frustum-shaped seat for the ball, and an inlet orifice at the opposite end of the bottom of the casing, of a lever suitably fulcrumed in the casing and provided with a depending portion designed to operate against the ball, a piston operatively connected to the opposite end of the lever and provided with a suitable relief orifice, a dash-pot within which the piston works provided with suitable cap and having a downwardly extending portion provided with ports below which the piston is brought when the valve is removed from its seat, as and for the purpose specified.

4. The combination with the casing provided with an inlet orifice and a flow orifice and the ball valve normally closing the flow orifice and the lever for operating the ball valve, of a dash-pot extending upwardly from the casing and a piston and piston rod connected to the lever, and a spring interposed between the lower end of the piston rod and the inlet orifice, as and for the purpose specified.



Flushometer.

SIMPLIFED SANITARY ENGINEERING METHODS.

(Continued from page 15.)

continuous waste and vent had been adopted. In reading over these articles we have had to continually remember that they were written many years ago, and since that time sanitary plumbing has improved very considerably. The influence of Dr. Gerhard and his methods have long since ceased to be anything but a negligible quantity of sanitary engineering circles and our only reason for writing this article is to prevent young and inexperienced members of the trade from absorbing ideas which are ancient, obsolete and retrograde.

Acquired the Plumbing Department.

T. A. Latimer has bought out the plumbing and tinsmithing department of the Orillia Hardware Company, of which he has had charge, and will henceforth conduct this branch of the business for himself, in the present premises in the rear of the hardware company's store. Mr. Latimer has established a reputation as a plumber and steam-fitter.

Getting After New Business

An Ontario Sanitary Engineer Relates How He Gets Business From the Farmer and Residents in the Rural Districts—Expects to do a Lot of Business With Them During 1915.

LAST issue we published a letter from one of our readers which told how he got after the farmer and residents in rural districts in an endeavor to get business from them.

We pointed out that there is lots of business to be had if the sanitary and heating engineers will go after it, and we are proving the assertion every day. It's an old saying and true that "the hen which is the best scratcher is the best layer," and it's the same with business men of every calling. The reason sanitary and heating engineers are as a rule poor business men is because they don't have to scratch for business. But they're doing it to-day with a vengeance.

The Sanitary Engineer promised last issue to relate to its readers how a certain sanitary and heating engineer in Ontario got after new business. This particular story is based upon an interview between the writer and a sanitary engineer who makes a study of country work.

Upon entering the establishment of our worthy friend the usual greetings were exchanged and the writer explained his errand.

"Well, now, Mr. ——, we are told you do quite a nice lot of business installing sanitary and heating systems in farm houses and country homes, and we should like to hear how you go about it, so that the readers of The Sanitary Engineer may 'do likewise.'

"We feel that there are lots of good prospects amongst the farmers, and we are sure that any member of the craft who loves his calling and is making a success of it, will only be too glad to help the other chap along."

The smile of an old-time plumber, of a man who has and is making good, is a thing of beauty and a joy forever. It was "some smile."

"Well," said he, "I'll tell you. We have a fine farming country round here, and some of the farmers are fairly well-to-do. They call at the store on market days for hardware and see our stock of plumbing fixtures. Whenever I hear that a farmer is thinking of making any improvements to his house I get right after him, pay him a visit, show him what comforts he can enjoy by having plumbing and heating in his home. I well remember talking over one man and finally getting an order for plumbing and heating to the extent of $900, and within the next few weeks I landed another order for a heating job, and inside of a couple of years I succeeded in getting a nice bunch of business from that same district.

"You know, Mr. Editor, the most important thing of all is to put up a good job," said Mr. ——. "Don't ever begin and discuss prices. Some time ago a shop was started in this town in competition with me. For quite a while everything went fine. I found my competitors were figuring fairly close to my prices; but having been in business here for a number of years, and having built up a reputation for doing good work, I, of course, got a preference, sometimes to the extent of 10 to 20 per cent. Then, all of a sudden, I began to hear of low prices, etc., and was asked to meet certain figures. This I would not do. I was quite ready to hang on to what money I had made and at the same time keep up my good reputation. I preferred to do this rather than sacrifice both in an endeavor to cut the other fellow out. In the long run I won out, for my competitor was not long in business, which proved to me that first and foremost one should study to gain a good reputation.

"Another scheme I find very effective, and one which assists me to land business from the farmer, is this: we have a brick yard down here. About this time of the year, when sleighing is good, I take note of the farmers who draw brick away to their farms, and I get after them in due course. Many a time they are not going to build for six months, but all the same I follow up the clue and keep right after them. I send out personal letters to prospects and follow these letters up with a call, not forgetting to take all particulars and information likely to be asked for.

"Not long ago I succeeded in getting the plumbing and heating for the new station at C——. Well, the farmers got inquisitive. I attended to the job thoroughly, had all kinds of information with me, and do you know, Mr. Editor, I landed no less than three jobs as a direct result of having given lots of personal attention to that job, and this spring I am going to get more country business than I ever did."

When asked if he liked the calling and enjoyed the work more than for the dollars he made out of it, he replied: "I don't think any man can make a real success in the sanitary and heating business unless his heart and soul is in the work, and I don't think it's possible to do a good job either unless a chap really loves the work.

"I remember well," he continued, "the time when lead work was all the go, and I would clean and rub up the lead piping, and then give it a coat of varnish to keep it from tarnishing. The price never bothered me, and neither does it to-day. If I can't get my price, I know I can't do my job, and, therefore, will not put up a job which will not bring me another."

Upon being asked if he thought there was plenty of work to be had from the farmer, he replied: "Yes, I think that if the sanitary and heating engineer who has established a good reputation will go the right way about it, there is lots of business to be had from the farmers and country residents, and one good job will bring more in its train."

Questioned as to collecting, he said: "Well, the main thing is to put up a good job and pay attention to details, and before the work is finished be sure and instruct the farmer all about it. Make him master of the installation, so that he feels he is indebted to you. I have very often been on a job at the finish, and brought the cash or a cheque back with me. It's all a matter of how you handle your man. There's many a sanitary and heating engineer, after landing a job, sends the stuff up to the house with a man and a helper, and possibly after paying one or two visits, he never goes near for a week or two after the work is done. Then he sends the bill and in another week or two's time calls for the account. Perhaps some little incidental thing has got out of order in the meanwhile, resulting in all kinds of annoyance. Instead of the boss being on the job often, and at the finish up particularly, to see everything O K, it is left to the man to do this. A customer thinks a great deal of a little personal attention from the boss.

"One thing I make a point of, and that is, never to send a bill out of any size without having first looked over the work and feeling thoroughly satisfied with it myself. I can safely say I've a larger percentage of satisfied customers on my books than most sanitary and heating engineers can boast of. It's all a case of knowing your job, doing a good one, and devoting a little personal attention, not only to the work, but to the customer as well."

New Sanitary and Heating Goods

AUTOMATIC CELLAR DRAINER

The Penberthy Injector Co., Ltd., are issuing a very interesting folder which describes their cellar drainer in a very able manner. To install any cellar drainer properly, one must know something about them.

This drainer is operated by city or town water pressure and is specially adapted for draining sumps, pits, cellars, tanks, or any place in which it is desired to keep water or other liquids from going above a certain level. It works entirely automatically and after

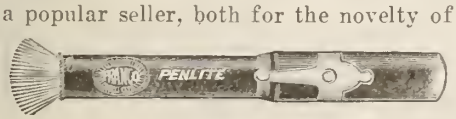
Penberthy Cellar Drainer.

once installed will keep the place free from water without attention from anyone.

These folders may be procured upon application to the Penberthy Injector Co., Ltd., Windsor, Ont.

THE PENLITE.

The Interstate Electric Novelty Co. of Canada, Ltd., are now offering to the trade what they term the "Penlite." It is an electrical flashlight, constructed so as to imitate a fountain pen, and is fitted with a clasp and held in the pocket in a like manner (or as a regular fountain pen). The makers state it will become a popular seller, both for the novelty of



The Penlite.

the same and the convenient manner in which it can be carried.

Air Towel Dries Hands.

An "air towel" used in the large public lavatory in the District Building at Washington, D.C., resembles a rectangular box eleven inches by three, set in a base having twelve-inch legs, with an opening in the top of the case in which the wet hands are held while being dried. The device consists of a blower that forces air through an electric heating element to ducts and deflectors suitably placed for distributing the warmed air to all parts of the hands at the same time, and is operated by a foot-lever or pedal, which in turn operates a quick-acting switch, thereby setting the blower in motion. By removing the foot the device is put out of operation. The hands come in contact with no part of the device, thus assuring a perfectly sanitary operation. It takes just thirty seconds to dry the hands, and, says the "Scientific American," although this seems a long while standing with the hands in the dryer and practically unoccupied, tests have shown that the ordinary operation of drying the hands with a towel consumes more time if the hands are to be dried as thoroughly as by the electrical drier.

Absolute Zero.

Two hundred and seventy degrees below zero has, from theoretical considerations, been known to be the temperature at which all molecular motion ceases. In other words, it is the temperature which a body will have when every particle of its heat is abstracted. The rate at which the pressure of a gas decreases as it is cooled shows us that the pressure should vanish entirely if the gas were cooled to a temperature of 273 degrees below zero. Now the pressure is due to the molecular motion which we call heat, and if this motion ceases it means that we have removed all of the heat; in other words, we have brought the gas to the lowest possible temperature. On this account it has been called the absolute zero, and scientific investigators have been struggling for many years to reach this ultimate goal, for it has been a practical certainty that many of the properties will disappear, or become profoundly modified, at the bottom of the scale of temperature.

Modesty is not the basis of advertising, and the merchant who is afraid to tell the public what a good stock and store he has and what good service he gives will die unknown.

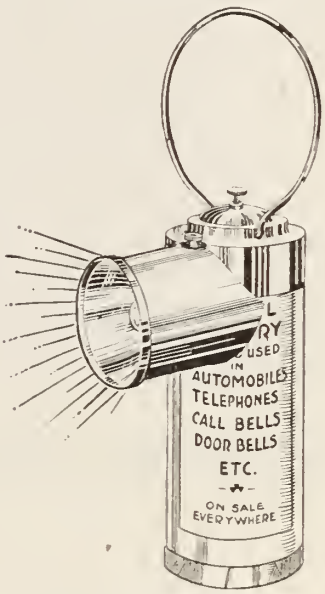
BRIGHT-EYE LANTERN.

THE accompanying illustration shows the "Bright Eye" electric lantern attachment which is a new device put on the market to operate on an ordinary dry battery.

The illustrations are self explanatory. The attachment merely slips on over the top of the battery and is screwed down by the battery thumbscrew.

It is made of brass, brush finished, and weighs but 5 ounces.

The manufacturers state that it will give a light when submerged in water for 24 hours. It retails for $1.35.



The Bright Eye Lantern.

The Chas. B. Ellis Company, 301 Power Building, Montreal, are the sole distributors for Canada.

LEAD WASHERS.

The American Casting Co., 52 Pearl Street, Brooklyn, N.Y., offers to the trade a new line of concave lead washers for galvanized iron roofing and siding.

The company states that, as galvanized iron roofing is liable to corrode where the nail or bolt is driven through the sheet, the use of the concave lead washers does away with the corrosion by making an absolutely water-tight joint under the nail or bolt head, thus preventing the water from accumulating there.

The washers are being manufactured by the company in all sizes, and in either flat or concave styles. They are packed in boxes containing 100 pounds each.

Practical Problems for Sheet Metal Workers

IN THIS issue we are illustrating how to develop the pattern for a bullhead or transition round base with a rectangular top, to be in two pieces. Fig. 1 is the elevation of bullhead or transition piece, and Fig. 2 shows the bottom and top, the top to one side leaving the back straight, while Fig. 3 is the plan showing the method of obtaining triangles; E F G H represent the bottom, and A D C B represent the top.

As the pattern is to be in two pieces it is only necessary to use half the plan. First divide the circle or bottom, into quarters. Then divide the two quarters represented by E H G into equal divisions and from the points in the section E H draw lines to the corner of top represented by B in Fig. 3, and from the divisions in section H G draw lines to the corner of top represented by C (Fig. 3). It will be necessary to construct the two diagrams of triangles one for each corner shown in Fig. 3, so as to obtain the true length of each line.

Lay off the line R J (Fig. 4) equal to the straight height of article (this is made to suit the work to be used on). From the point J and at right angles to R J set off the length of lines in the section E to H, making J 1 equal to B 1, J 2 equal to B 2, etc. From the points thus established in J W (Fig. 4) draw lines to R as shown.

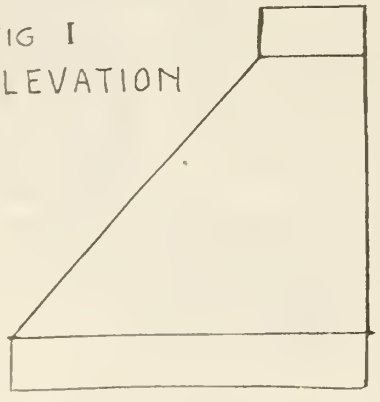
To obtain the triangles for the section H G proceed to draw lines same as in Fig 4. Make V S same height as R J (Fig. 4), draw S T at right angles to V S, and on the lines S T set off the length of lines in section H G, making $S1^1$ equal to $C1^1$, $S2^1$ equal to $C2^1$, etc., and from the points thus established in ST (Fig. 5), draw lines to V as shown.

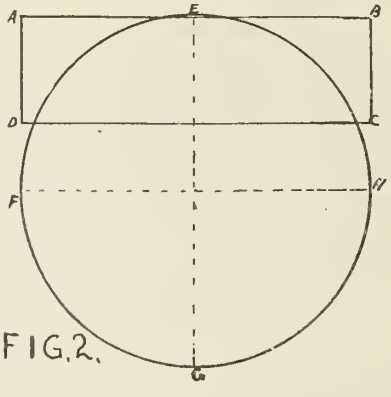
To obtain pattern lay off line $1E^1$ (Fig. 6), from point E^1 and at right angles to $1E^1$ draw line E^1B equal in length to E^1B of plan (Fig. 3), which is the same half the length of long side of top. Set the dividers to R1 (Fig. 4) and with B of pattern as centre strike arc cutting the line $E^1 1$. Then draw line from where they cross to B (Fig. 6), with B as centre and R2 (Fig. 4) as radius, describe an arc with the dividers set to the same space used in stepping off the plan.

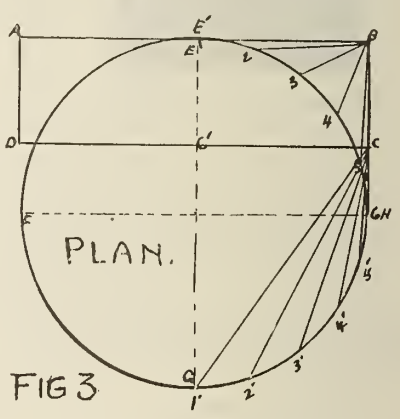
With 1 of pattern as centre strike a small arc intersection at 2 with arc previously drawn. With B (Fig. 6) as centre and R3 (Fig. 4) as radius describe an arc, and with the dividers set to same space used in stepping off the plan strike small arc intersecting at 3 of pattern. Proceed in the same way to lay off the lines 4, 5 and 6. Then to obtain the point C of pattern set the dividers to B C of plan (Fig 3), with B of pattern as centre and B C of plan as radius, describe an arc, and with V 6 (Fig. 5) as radius and 6 of pattern as centre strike an arc intersecting with the arc already drawn. This will give the point C of pattern. With C of pattern as centre and V 5 (Fig. 5) as radius, describe an arc and with the dividers set to same space used in stepping off plan using 6 of pattern as centre strike small arc intersecting at 5^1. The remaining line 4^1, 3^1, 2^1 and 1^1 are established in the same was as the preceding one.

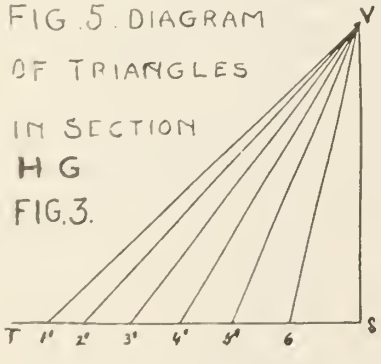
To complete the pattern set the dividers to C^1C of plan and with C of pattern as centre strike a small arc and from 1^1 of pattern as centre and the slant height of article (Fig. 1) as radius strike an arc intersecting at C^1. Then lines traced through the points thus obtained will give the pattern required.

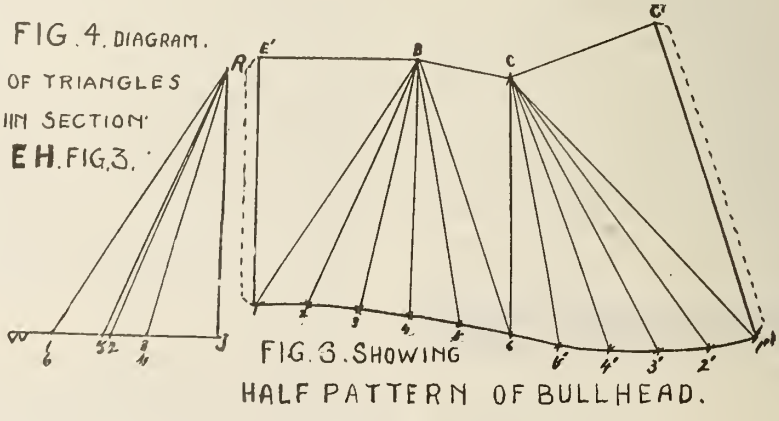
All edges to be allowed.











Development of Pattern for Bullhead.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

LOWER BOILER IS COLD.

Editor Sanitary Engineer.—Herewith. I enclose a layout of two boilers above each other, on separate floors. As the job stands now the boiler upstairs gives full satisfaction as regards the heat, whilst the boiler below is cold. Before the alteration was made we got the reverse result, the first layout is shown by the dotted lines.

Would it have been satisfactory if we had used ¾ inch pipe risers to the upper floor? The heater is a Domestic combination boiler under city pressure.

PLUMBUM.

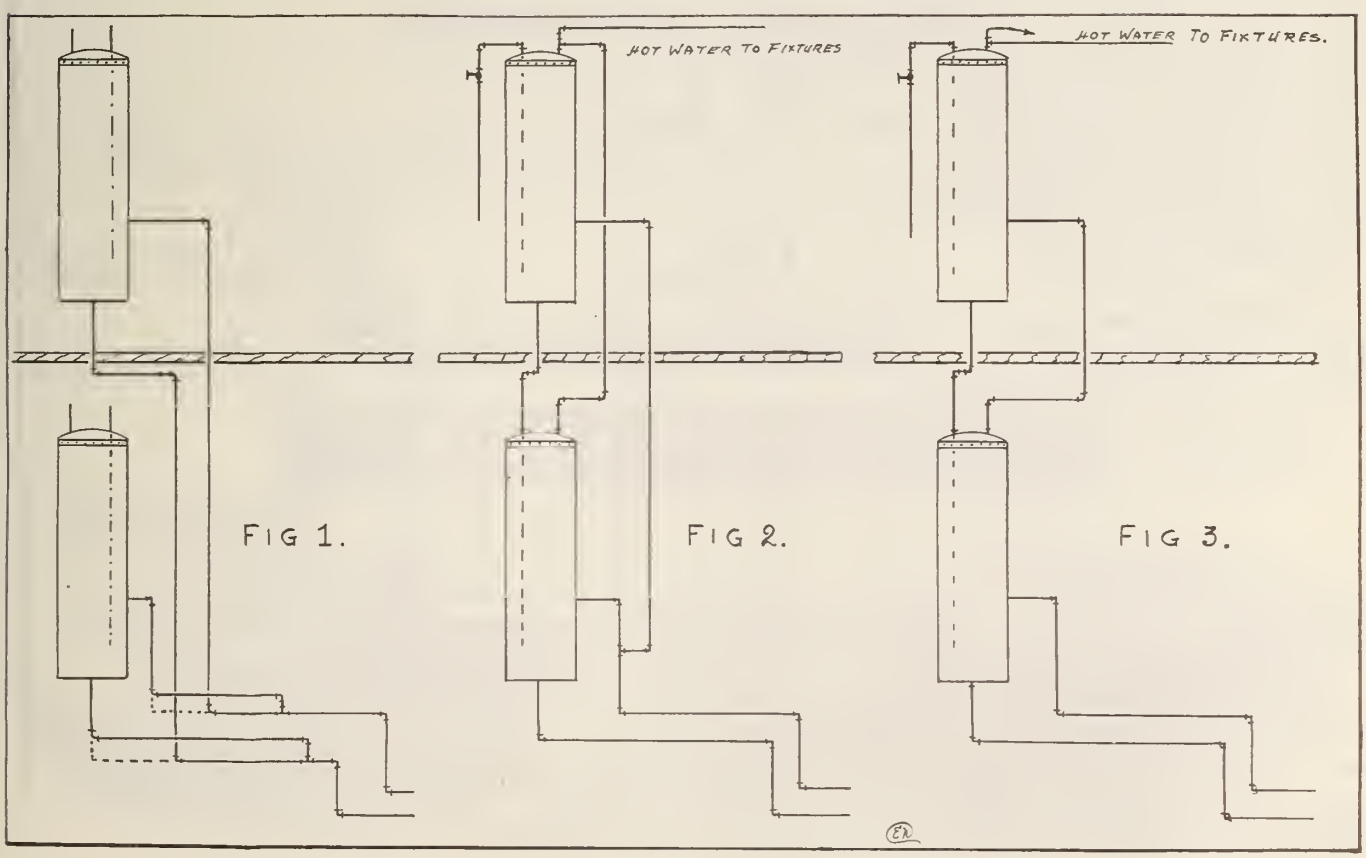
This installation is rather unusual and the first layout as shown in Fig. 1, by dotted lines. was almost the same; but it will be seen that there was increased friction placed on the lower boiler when the change was made. We are showing in Figs. 2 and 3 how this trouble may be overcome.

In Fig. 2 the bottom pipe is carried to the bottom of the boiler as in ordinary practice, as also is the upper pipe, except that a branch is taken from the latter and connected into the side of the boiler on the upper floor. Next a pipe is run down from the bottom of the upper boiler into the lower boiler as shown. Remember this is into the connection which has the tube attached to it. Next connect the hot water supply pipes in the most convenient manner.

Fig. 3 shows another layout which to a certain extent is better than Fig. 2, in that it is impossible to get one boiler hot very much quicker than the other and if these two boilers are in an apartment house, it is impossible for one tenant to get all the hot water and the other none.

We do not think there would be much gained by changing the piping of the upper boiler from 1 inch to ¾ inch. seeing that it is already installed, and even

(Continued on page 30.)



Lower Boiler is Cold.

(Continued from page 28.)

it a new installation were to be put in, we would still advise one inch pipe from the heater to a point where the two pipes are branched.—Editor.

Will This Heat Radiator and Coil?

Editor The Sanitary Engineer:

I have installed a range boiler and have connected a coil and radiator to the range water front, as shown in enclosed sketch. My customer refuses to pay me for the job even though I stated at the first that I was not sure of the water-front heating all three. As the matter stands, there is heat enough in the boiler and the radiator, but not too much; in fact, the water in neither the boiler or radiator would be satisfactory if any cooler. Now, the coil does not heat very well, and I maintain that if it is made to heat, it will rob the boiler and radiator. Am I right or not? The boiler is 30 gallons, and radiator is 26 feet, neither of which would be satisfactory if any cooler.

"C." West Toronto.

We reproduce the sketch submitted, and in replying to C we may state that while the coil would have given better satisfaction if the return pipe had been carried down from the water-front and up to the coil, and the top pipe connected to the top of the header, we not not think under the circumstances that it would be advisable, because of the fact that the water is not too hot in either the range boiler or radiator, and if the coil was re-piped and made to heat, every unit of heat it got would reduce the temperature of the boiler and radiator. We should advise dispensing with the coil or providing some other means than a range water-front.—Editor.

Who Makes the Gloria Light?

Editor The Sanitary Engineer:

Will you please inform me who manufactures the "Gloria" light, a hollow wire system of gasoline light.

R. E. KING,
Maitland,
Hants Co., N. S.

The Gloria Lighting Co., 1274 Washington Boulevard, Chicago, U. S. A. —Editor.

Vent and Overflow Into Stack.

Editor The Sanitary Engineer.

Being a subscriber to your valuable trade paper, may I ask you through the columns of the Question Box whether you would or would not think it satisfactory to connect a vent and overflow from a hot water heating system into the stack pipe of plumbing? I have taken The Sanitary Engineer for several months, and am well pleased with it.

T. E. D.

We would not advise our correspondent to connect the vent and overflow to soil pipe stack by any means.

In fact, we do not favor the galvanized enclosed expansion tank at all for small residence systems. In such climates as we have in most parts of Canada, the automatic tank is by far the best, and there are quite a few cities where nothing else is used. By using the automatic expansion tank there is no need of a vent and overflow being put through the roof.—Editor.

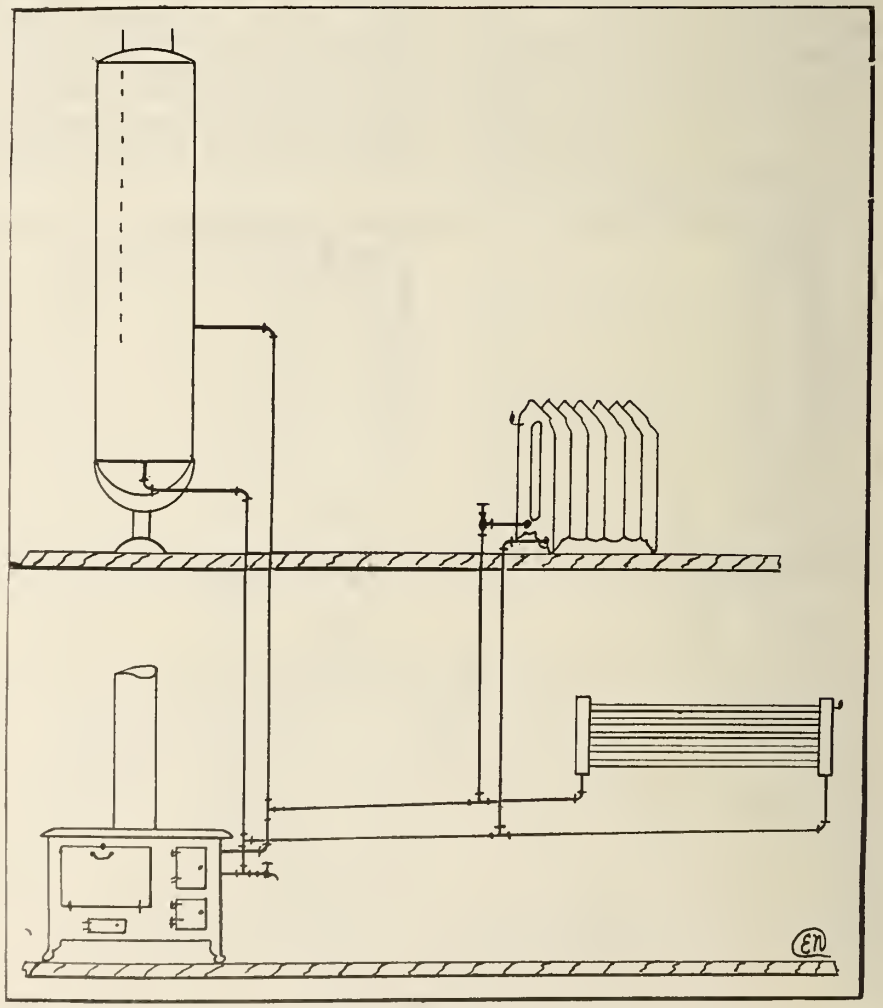
Persistency.

Persistency is one of the strongest factors in successful business life. The man who is vacillating and unstable, accomplishes very little—and much that he succeeds in doing is generally done very poorly. In order to succeed, one must map out a practical course of action and persist in it, in spite of discouragements and difficulties; which should be the fuel to furnish incentive for vigorous action.

The man who does something to-day, and who by reason of his vacillating and uncertain temperament undoes it to-morrow, or next week; the man who is continually pulling down the structure which he has labored hard to upbuild, can make very little headway. However little he builds to-day, he must build for permanency; and if he works along the same lines persistently and determinedly, the result of his life's work will be something worth accomplishing.

"Business As Usual" in New Brunswick.

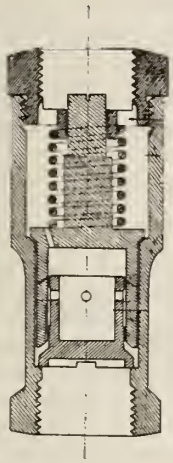
It's business as usual with the New Brunswick towns. In St. John the Commissioner of Water and Sewerage is asking for a bond issue of $24,000 to enable water extensions to be made to outlying localities. Chatham has authorized an issue of $20,000 for the same purpose. St. Stephen, Woodstock, Fredericton, Moncton, Sackville and other N. B. towns are also adding to their civic undertakings.



Sketch submitted by "C."

The Knickerbocker Regulator

---a safe and positive remedy for faulty hot water systems



SECTION

Entirely automatic in its action on **both open or closed systems** of hot water heating. Easily applied to old as well as new. Connects with one-inch nipple to outlet on top of expansion tank.

Increases radiation from 25 to 30%. Reduces the size of pipes and fittings. Makes a hot water system equivalent to low pressure steam plant.

Get it now. Its service guarantees satisfaction, and there is a very liberal profit.

Particulars on request.

The James Morrison Brass Mfg. Co., Ltd.
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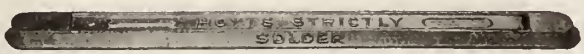
Our Mixed Metal Sales Amount to Over $5,000,000 Annually



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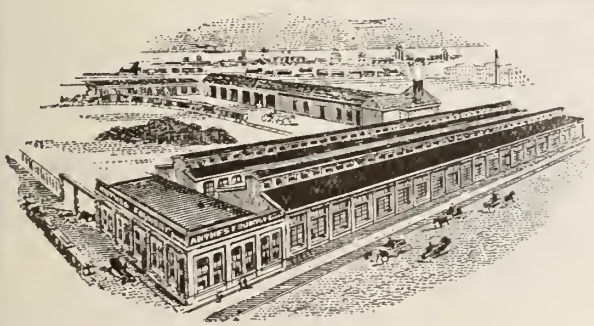

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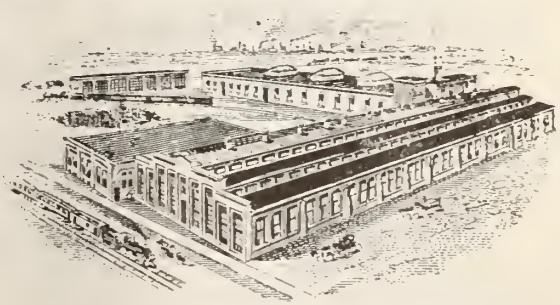

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"Scientific" Acetylene Generators

The latest development of acetylene generators. No storage of gas, Perfectly automatic, Simple in operation. Think of the Residences, Churches, Stores, Hotels, etc., in your vicinity that require better light.

A profitable business for every plumber who is open for business. Why not investigate?

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Out of One Hundred Men who Essay to Run Retail Stores, Ninety-five Fail

Fewer men succeed at keeping store than at any other occupation. It seems easy to make a living by selling goods at a profit. To the outsider a retail store looks like an El Dorado of Easy Gains. But only five per cent. of the men who attempt to grasp these easy gains achieve a permanent success.

Why?

This is a question that affects not only retailing, but every branch of business. The manufacturer, the wholesaler, the banker, are all directly concerned. Conditions which affect the merchant reflect their influence on all branches of industry and commerce. If a man starts a retail store and fails, the manufacturers and wholesalers who supplied him with goods share in the loss. The banker may also figure in the liability. On the other hand when a merchant, by force of good merchandising and sound business methods, works up a profitable and permanent business, the manufacturer, the wholesaler and the banker all share in his prosperity.

AND SO THE REASONS FOR THE LARGE PERCENTAGE OF FAILURES IN THE RETAILING WORLD ARE OF DEEPEST INTEREST TO MEN IN ALL BRANCHES OF BUSINESS.

Under the title "Service and Super-Service," William Byron tells in the February issue of MacLean's Magazine why the few succeed and the many fail. Briefly, it simmers down to this: The man who goes into business to sell goods cannot win his way to the top—and stay there. In order to succeed it is necessary to sell service—even super-service—to the public; the best possible service compatible with a reasonable profit. Too much service is as bad as too little, for after all a man cannot stay in business unless he is making a profit.

You will be interested in seeing the development of this theme, in reading the article through. It contains a wealth of valuable information.

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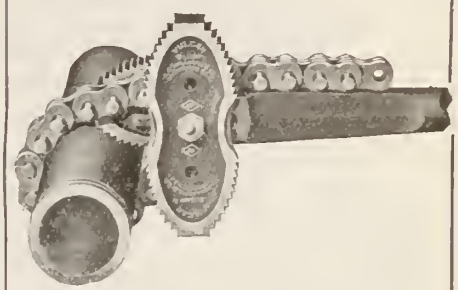
Send for free pamphlet



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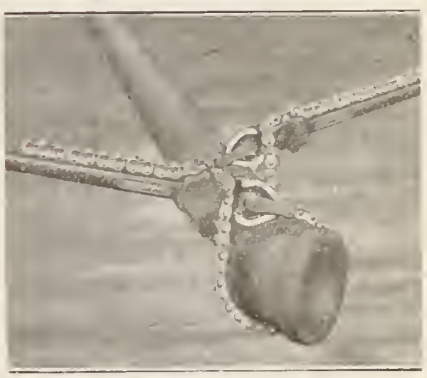
With Double-Ended Reversible Jaws

"Two in one" at the price of one

—for Pipe, all sizes



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Single Jaw for both Pipe and Fittings

Both with world-wide proof of efficiency and greatest worth.

Drop-forged, selected steel parts, machine tested, before shipping, to 2-3ds of advertised strength of chain.

Invaluable tools in all pipe work, for all pipe sizes.

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Superior Drop-Forgings

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Perfect Control of Pressure is assured when you install the

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Reducing and Regulating Valves

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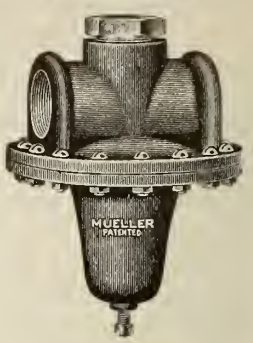
Reducing and
Regulating Valve



D 13160

The 13160 type shown here is an exceptionally accurate valve on steam or water, or on air, oil and gas.

These valves are especially adapted for service on water where considerable reduction and close regulation are required and for steam heating systems for any pressure as low as 5 pounds vacuum.

Try these great valves. You will not be disappointed. We can assure you of their efficiency, accuracy and durability.

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Send me your No. 5 Regulator catalog.

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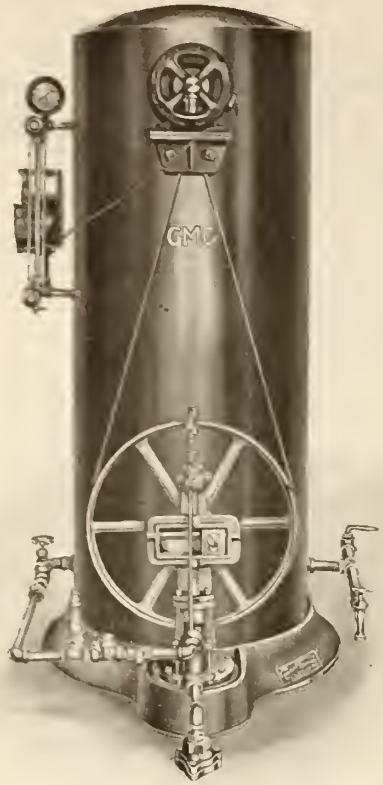

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DART UNIONS ARE HEAVY-MADE—they do not expand or contract and are not affected by vibration.

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Help us keep it busy.

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Best quality of goods.
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THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX. Publication Office: TORONTO, MARCH 1, 1915 No. 5

The principal feature of this Lavatory is its narrow width, which permits its use in places where sufficient space is not available for an ordinary-sized fixture.

Plate X-109
The "Corridor"
Actual size
13 x 25¼"
Rim, 2½"
Back, 3⅝"
Oval Bowl
9¼ x 15¾"
Centre Outlet

Plate X-109
The "Corridor"
Extreme width
is only 13"
Designed
Especially for
Small Offices
Private Closets
Corridors, etc.

Not illustrated in Catalogue "F"

Prices, descriptions, etc., furnished upon application

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Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

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BRITISH COLUMBIA:
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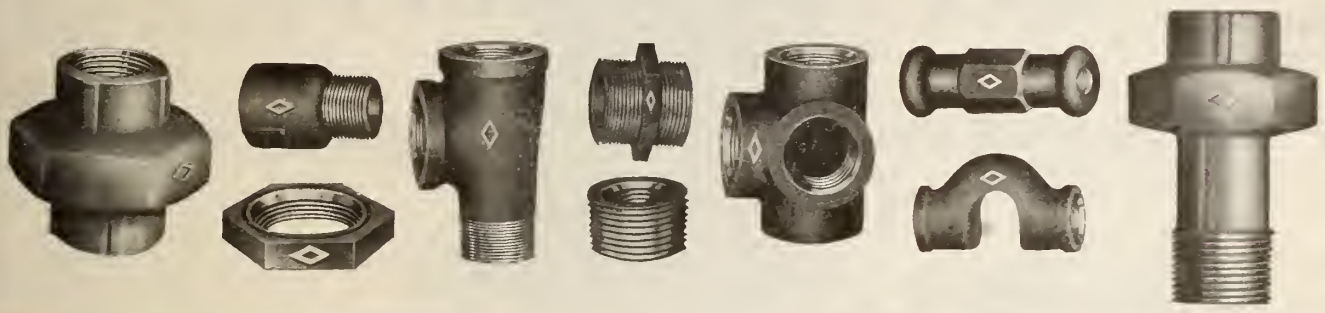
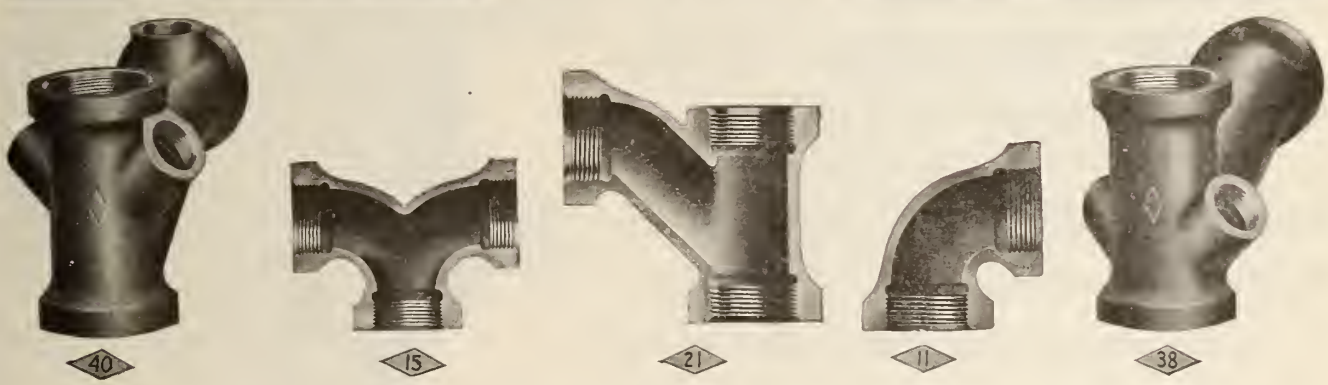
PIPE FITTINGS





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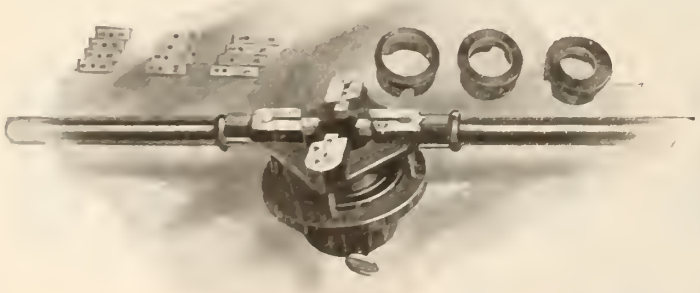
Perfect threads any size up to 12" finished at one cut by one man.

IT PAYS TO USE THE BEST TOOLS.

Jardine No. 22 cuts 2½ in. to 4 in.



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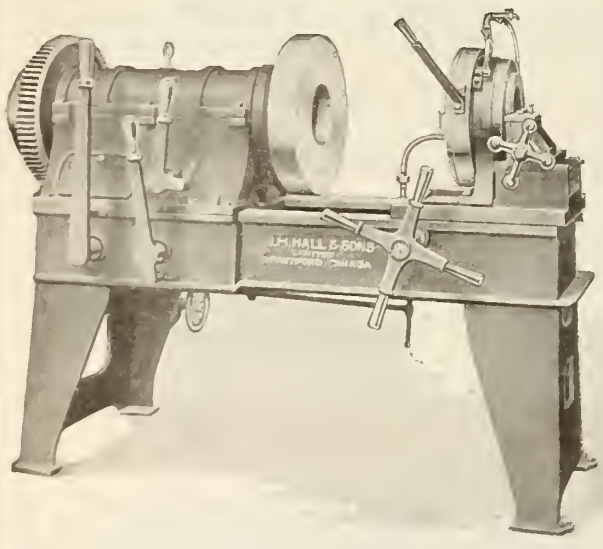

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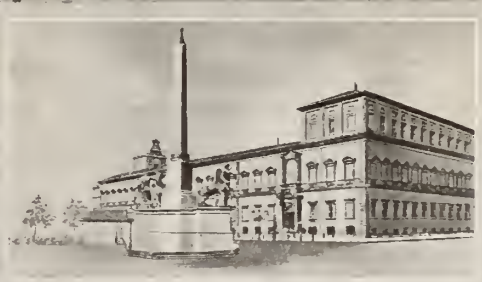

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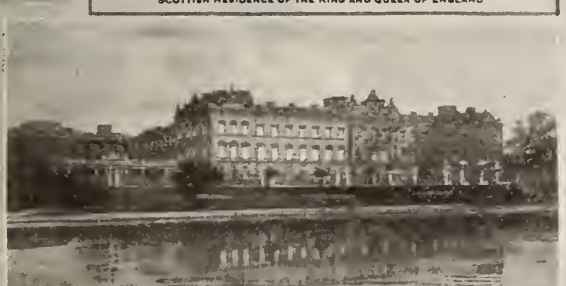

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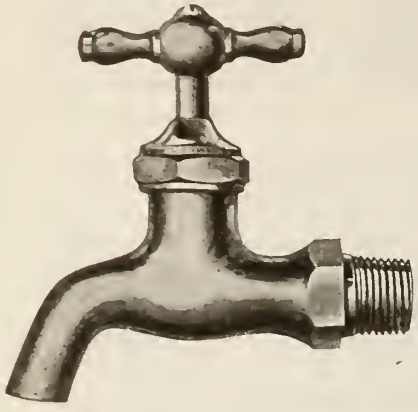

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One of its vital parts and some of the interesting points it involves

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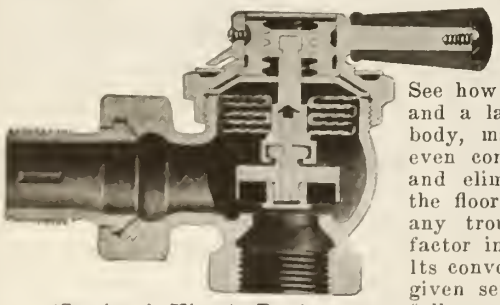

(Sectional View.) Dunham Packless Inlet Valve.

Dunham Packless Inlet Valve.

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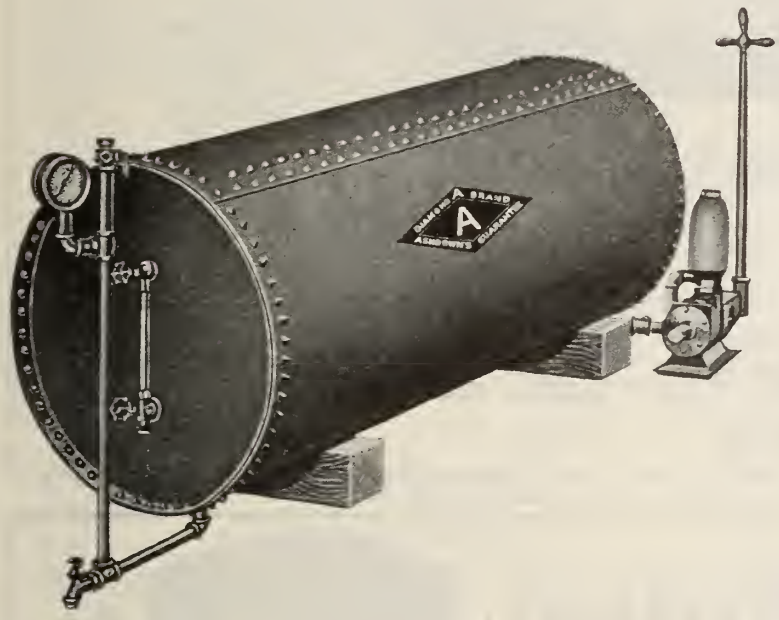

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JH 1403	30x8	295	195	840
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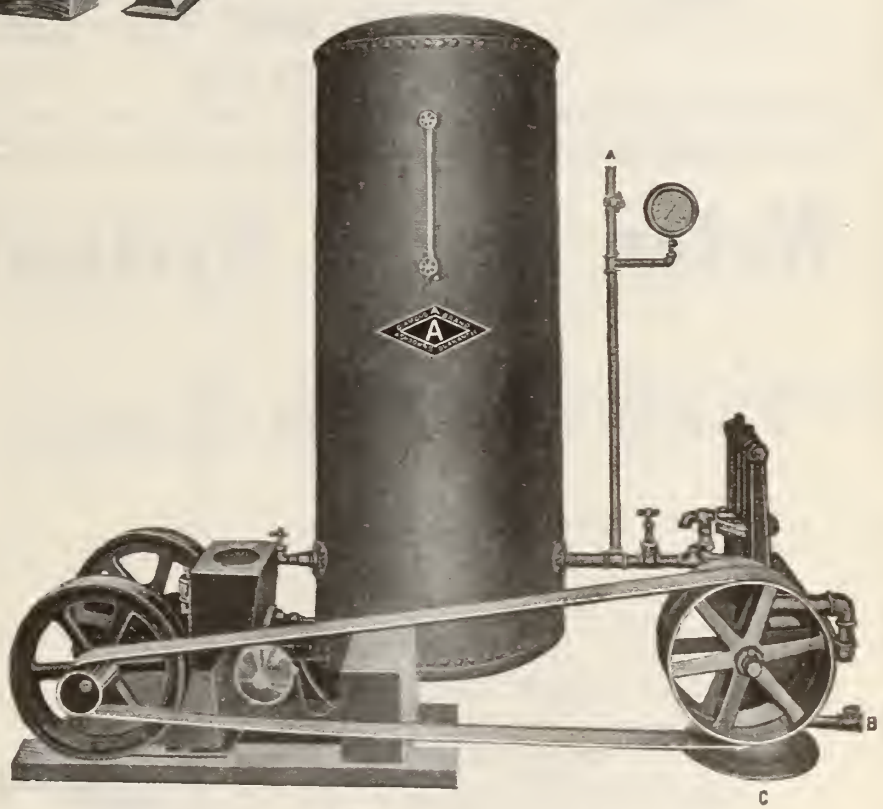
JH 1405	36x8	420	280	1080

NOTE: 6-foot tanks arranged to set vertical or horizontal.



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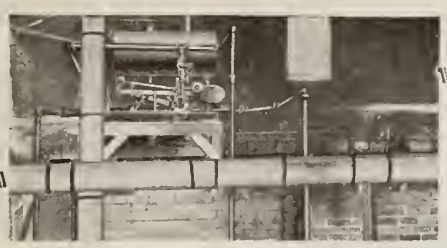
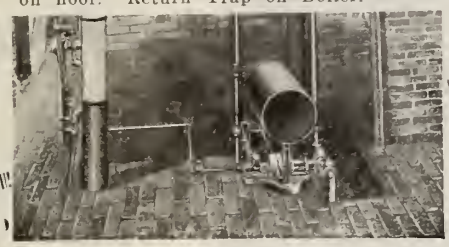


Morehead Condenser Trap Installation on the boilers of the Maumee Brick and Tile Co. Plant, Ft. Wayne, Ind. Condenser Trap on floor. Return Trap on Boiler.



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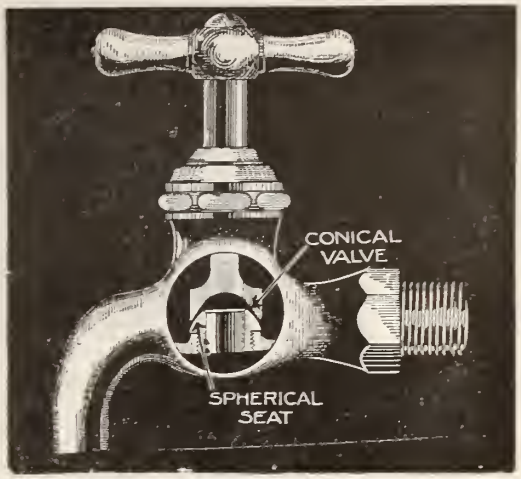

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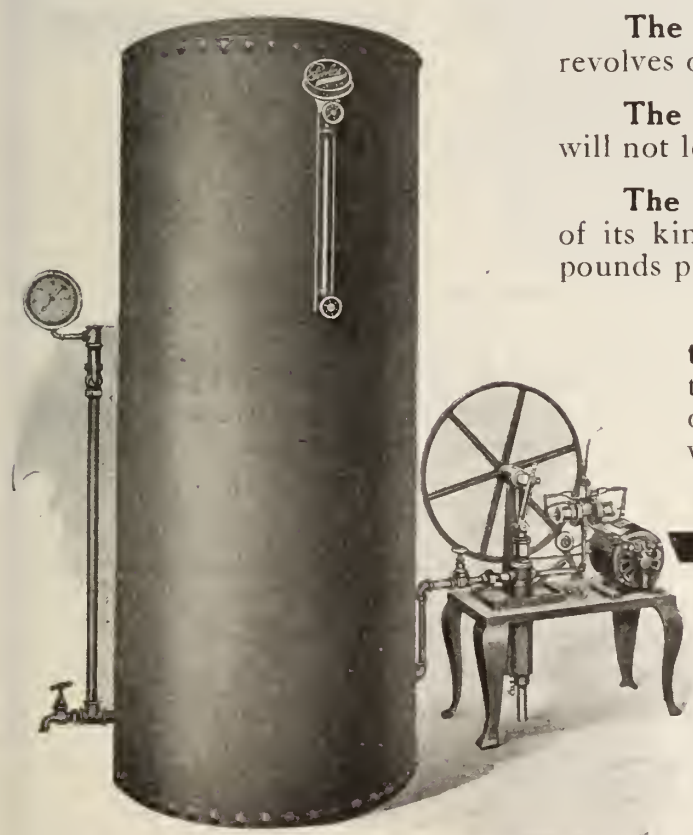

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PLUMBER and STEAMFITTER of CANADA

Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, MARCH 1, 1915 No. 5

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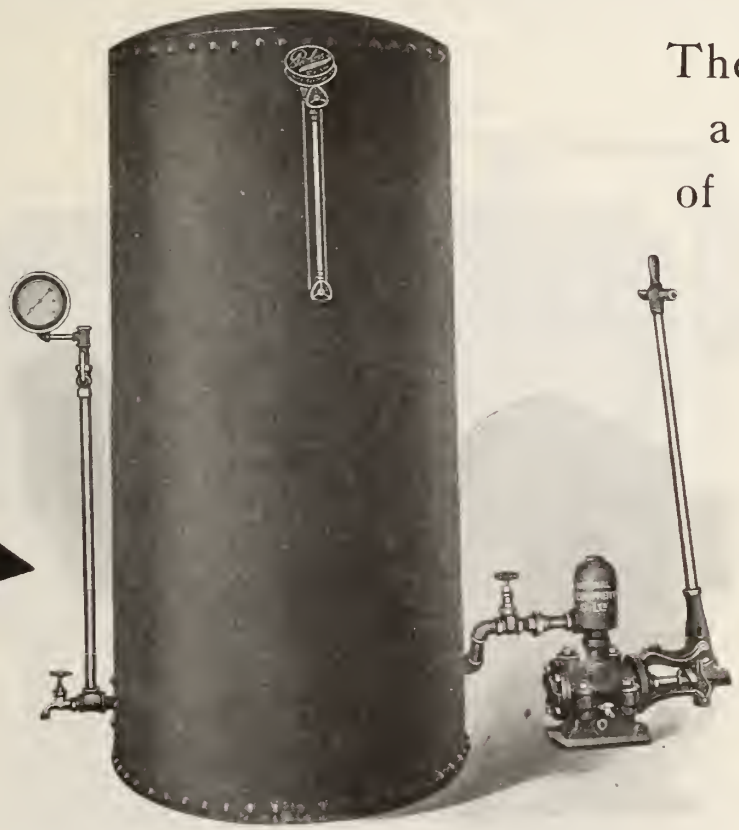

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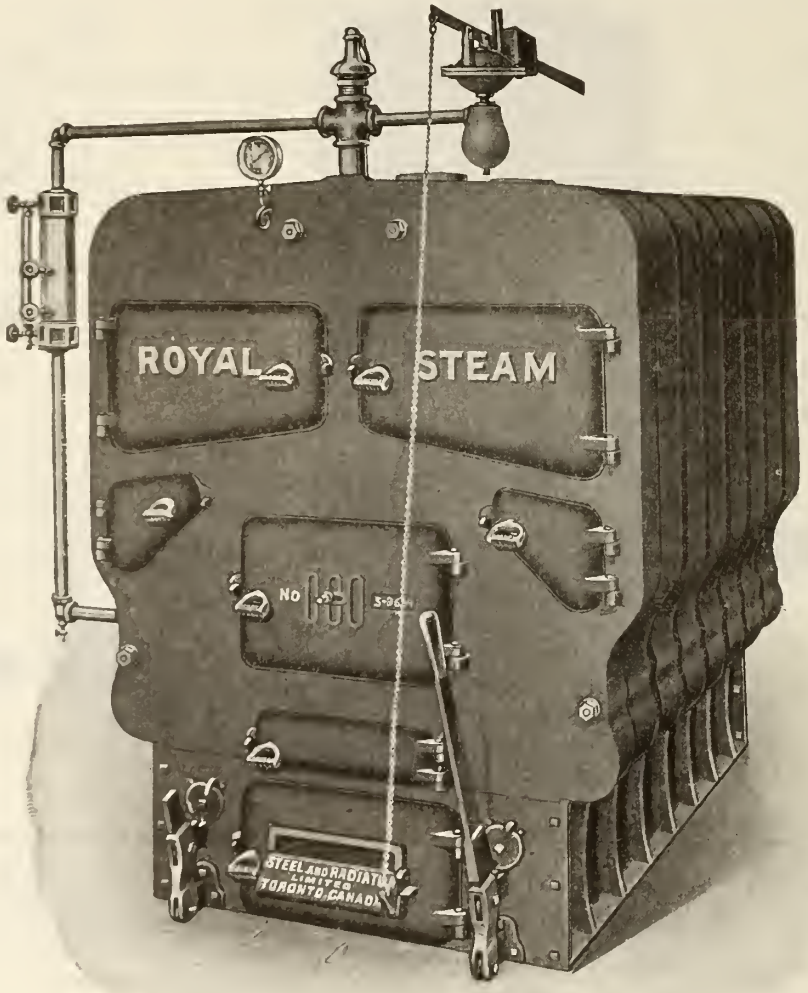

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THE SANITARY ENGINEER

VOL. IX. MARCH 1, 1915. No. 5

Simplified Sanitary Engineering Methods

Being a General Discussion upon the Gerhard Articles Which Recently Appeared in The Sanitary Engineer, and also Commenting upon the Article under Above Heading which Appeared in Last Issue.

IN our last issue we published an article which had been read before the Canadian Institute of Sanitary Engineers of Winnipeg and St. Boniface, and have since received quite a few comments upon it as well as upon the Gerhard articles which had previously appeared in The Sanitary Engineer. In the first place we would remark that we published the Gerhard articles with a view of showing our readers what had been advocated as far back as seventeen years ago and we have not the slightest doubt that most of our readers will agree with us when we say, that if the trade had acted in the real spirit of simplifying plumbing construction rather than upon definite plans laid down which complicated rather than simplified such construction there would have been greater progress made than has been the case to date and all will admit Dr. Gerhard deserves great credit as a pioneer in advocating simpler methods so much in advance of those of most members of the trade. One of our readers commenting upon the Gerhard articles stated in part:

"It does one good to see how The Sanitary Engineer is striving to bring about the adoption of simplified methods, and I have enjoyed the articles written by Dr. Gerhard very much. Of course I do not quite agree with him in some cases, but cannot fail to realize how slow we have been in not adopting better methods in sanitary engineering construction than we are doing. When passing judgment upon the Gerhard articles I also realize that they were written some years ago and were certainly greatly in advance of anything else at the time."

Another of our readers in a letter received the other day referred as follows to the articles recently published in The Sanitary Engineer on simplified plumbing:

"I am gratified to note the progressive stand taken by your paper concerning recent developments in the plumbing business. This matter of "simplified" plumbing is one which calls for the earnest consideration of every man who makes his living at the business.

I have long been an advocate of progressive ideas and methods and believe that the sooner the plumbers wake up and realize that the old theories are erroneous and that the old methods are obsolete and cannot be longer defended the sooner will they be able to take their place as members of a scientific profession, and regain the confidence of the public which is becoming better informed and not so gullible as it used to be."

There's not the slightest doubt but that the public are becoming more educated than ever and are wanting to know the why and wherefore of certain methods adopted in the sanitary engineering business.

There are of course quite a number of progressive methods being adopted in certain localities in Canada where up-to-date ideas are gaining ground, but even they have only recently taken up the ideas in favor of simplified plumbing.

Last year the members of the Winnipeg plumbing department did more than any other body of men towards arriving at some definite methods of proper construction re the roof terminal, though elsewhere all over Canada the thinking craft never really did anything, spite of the very elaborate proofs against long lengths being installed. Most of the largest cities in Canada demand that these terminals be even as long as 15 feet, and so it goes on.

Commenting upon this article which concludes that Dr. Gerhard's methods are obsolete, let us quote a few of the paragraphs which are referred to and which will be found at the foot of page 13, Feb. 15 issue.

(1)—Always avoid conditions which favor siphonage. The comment on this is:—

This is a strong argument in favor of backventing.

Now The Sanitary Engineer holds no brief from any one, but cannot agree with this argument, it holds rather the very opposite opinion that what really causes siphonage is too small size waste pipes and too long branches, and any advocates of small waste pipes favor them because of there being a tendency for them to be self-cleansing. Now, what choice is to be made?

Are we to encourage siphonage by using small pipes, and then to break siphonage set up, must complicated backventing systems be instituted?

(2)—Soil pipes should not be made too small. The comment on this is:

Opinions vary on this subject, etc.

No doubt opinions do vary, but we have pointed out this matter in our comment to question (1). We will, however, admit that while 5-inch pipes seem to be too large, we can cite scores of cases where additions to such installations have been made and where it has been found that by having installed a size too large, there has been no pulling out of waste or soil pipes because they have been found to be not large enough. On the other hand we have remembered scores of cases where on account of these pipe lines being simply of sufficient capacity for existing fixtures, they had to be torn out and larger ones installed. In this installation described in Fig. 92 in the Gerhard article each horizontal 5-inch line is not only acting as a vent and waste pipe but also to relieve back pressure which would be caused by flushing the large fixtures on the upper floors. We as sanitary engineers have not been in the habit of considering the question of back pressure sufficiently and under the circumstances we must endorse the stand taken by Dr. Gerhard. In any other lines of engineering where pipes of any

kind are used, those installing them would never dream of using too many branches of the same diameter as the main pipe, and sanitary engineers will find as time goes on that they are no exceptions to the rule.

We do not adopt the same rule in vent pipes, very seldom do we use a 2-inch straight tee, which would mean that we were taking two 2-inch vents off one 2-inch vent, then why should we adopt such a practice when installing waste pipes? Particularly when such waste pipes are acting as vent and back pressure pipes to fixtures on an upper floor.

(3)—Join branch wastes independently to larger waste or soil pipes.

Comment.—This is a good point to consider. But is liable to increase the expense of installation.

We fail to see how this could be, because when branches belonging to smaller fixtures are connected to wastes actually installed for larger fixtures, there is a greater tendency to set up siphonic action to the detriment of the smaller fixtures, and thus these fixtures would require to be back vented, when by installing them into, say the main vertical stack, these vents in nine cases out of ten would not be required. At least not for traps belonging to the highest fixtures in the buildings.

Regarding styles of traps, we do not think Dr. Gerhard would advocate the use of all and every kind of trap which is claimed to be anti-siphonic, neither do we for one moment think anyone would advocate traps with interior mechanism on the sewer side of a trap. But we must not forget this point, a round drawn pipe trap is the most easily affected by back pressure and siphonic action according to its depth of seal, as well as the distance between the centre of the inlet and outlet. As for the feature of self-cleansing, which is claimed for the round pipe trap; this is not to be depended upon, for this reason: One family uses more hot water than another, and the hot water will cause the slime from soap to become more soluble, therefore the walls of the trap do not chill the soap, etc., and are, therefore, kept cleaner.

Another family may have a poorly heated bathroom or kitchen, and do not use sufficient hot water, then the walls of the pipe easily chill the soapy, slimy substances, and in a very short time the traps are fouled. The writer has in 25 years found all manner of traps in a very filthy state, and some just the reverse. It matters not what kind of trap is installed they should be cleaned out periodically. If there were more attention paid to covering soil and waste pipes which pass through cool places, much of the trouble with choked waste pipes would be eliminated. As for depending upon the claims of self-cleaning traps, it is foolish.

In conclusion we wish to assert that while there are certain parts of Canada which have absorbed the spirit of simplifying plumbing and are putting the spirit into practice the percentage of population which these localities represent, does not amount to more than 35 of the whole, and, if the rising generation will absorb the spirit rather than the actual letter of Dr. Gerhard's articles, there will be greater progressive strides made within the next ten years than have been made within the last fifty.

What is wanted in this profession are men who do something, say something, and in that way get men to think and act, even though half that is said and done prove to be only 50 per cent. right. In our next issue we will show how at this date some of our sanitary installations can be improved over the methods which Dr. Gerhard advocated seventeen years or so ago, though we must impress upon our readers that it is not the men who are improving matters to-day who deserve all the credit, but rather such men as Dr. Gerhard who have been hammering at it in spite of all opposition. How many men are there in the trade to-day who dared to speak against crown venting ten years ago? We venture to say not many, and even to-day some of the localities who have condemned crown venting are allowing a trap vent to be used which is little or no better than the crown vent. All these discussions about vents, terminals, main housetraps, breathers, etc., only go to prove that the Federal Government should establish experimental laboratories in various parts of the Dominion so as to enable this profession to agree upon some definite sanitary ordinances. The task is too great for even one province to take up, and where almost every climatic condition of the world prevails in some provinces, the burden of the research work would be upon that one province.

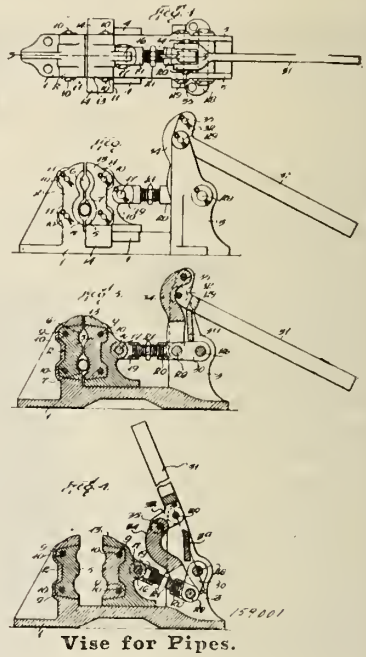
NEW CANADIAN PATENTS.

No. 159001.

Frank Joseph Callan, Boston, Massachussets, U.S.A., 17th November, 1914; 6 years. Filed 17th September, 1914. Receipts No. 249,192.

Claim.—1. A vise comprising a base having a fixed jaw, and a fixed standard spaced from said jaw, a moveable jaw slidingly engaged with the base between the fixed jaw and the standard, a toggle connected by an outer pivot with the movable jaw and by an inner pivot with the standard, and manually operated means for forcing the toggle to a position of rest with the jaws opened, and to an active position with the jaws closed, said means having provisions for automatically confining the toggle in its active position.

2. A vise comprising a base having a fixed jaw, and a fixed standard spaced from said jaw, a movable jaw slidingly engaged with the base between the fixed jaw and the standard, a toggle connected by an outer pivot with the movable jaw and by an inner pivot with the standard, manually operated means for



Vise for Pipes.

forcing the toggle to a position of rest with the jaws open, and to an active position with the jaws closed, said means having provisions for automatically confining the toggle in its active position, and a stop for limiting the movement of the lever to its jaw closing position.

3. A vise comprising a base having at one end portion a fixed jaw and at the opposite end portion a fixed standard, a movable jaw slidingly engaged with the base between said fixed jaw and standard a toggle connected by an outer pivot with the movable jaw and by an inner pivot with the standard, said outer and inner pivots being on a plane substantially parallel with the base, a hand lever fulcrumed on the standard at a distance from the said inner pivot, the lever fulcrum and inner pivot being on a plane at an angle to the base, and a link pivoted at one end to said lever and at the opposite end to the toggle knuckle and adapted to co-operate with the lever in forcing the toggle to a position of rest with the jaws opened and to an active position with the jaws closed, the arrangement being such that the weight of the lever is adapted to confine the toggle in its active position.

Is Woman's Work Appreciated?

Another Proof That There is Plenty of Work Ahead for the Sanitary and Heating Engineer Amongst Farmers and Residents of Rural Districts—That Farmers as Well as City Dwellers do Not Appreciate the Services Which the Wives of Rural Residents are Giving.

NO doubt the work of the city housewife is to some extent more congenial than that of the wife of a farmer. In the average city dwelling there are such conveniences as a bathroom, hot and cold water at the tap, furnace and so on, but there is also the noise and dust and, in most cities, the water is not by any means as pure as that to be had on the average farm. Thus on the one hand there are quite a number of conveniences for the wife of a city dweller, which the average farmer does not enjoy, yet the city dweller has not the advantage of pure air and water which the farmers have. In most cases the farmer's wife must bake, wash, starch and iron her linen as well as cater for the comforts of those of the male occupants of the home. It is also said that thousands of farmer wives are required to split wood, pump and carry water, milk cows, make butter and cheese and what not, besides bear the burden of motherhood, whereas the wife of a city dweller is very seldom asked to bake bread; there is no butter or cheese making; no cows to milk nor the thousand and one other things which the wife of a farmer must do. And yet, it would be safe to assert that not 10 per cent. of the farmers seem to realize that on every farm, without exception, every convenience which would lighten the housework more than 50 per cent. and make it a pleasure, can be supplied by the sanitary and heating engineer.

Here we are in this age of progress, allowing women on farms and in rural districts to do in actual fact what 99 out of every 100 city wives would absolutely refuse to do, and they, poor souls, go on, never uttering a word of complaint.

Now, do we appreciate this service, this slavery, for it is nothing less? If the farmer's wife must do justice to the duties of motherhood, she should at least be given all the assistance which this age of progress can provide.

If the farmer is shown a certain new plow, harrow or binder, he must have it. If he hears of some new feed trough, incubators, etc., he must by all means procure these things at any cost. But the housewife goes on pumping and carrying water, splitting wood and firing up, not only for cooking, but also for heating the house as well.

The case of the farmer's wife has been occupying the attention of the United States Department of Agriculture, and with results that go far to prove the oft-repeated contention that she has not been receiving the consideration which is rightfully her due. The department sent circulars to 55,000 farmer's wives asking them to state their needs. The response was large and pathetic. The overwork of farm women and the fear of the effect o fit on their children was the burden of many replies. Many asked the department to prove to the men that the women's work is worth something in dollars and cents. Others said that their own lot is hopeless, and asked only that better schools, cheaper books, more lectures, libraries and museums be provided for their children.

Why is it that so little attention is paid by the average farmer to the welfare of his life-partner? Why is it that in so many cases there is greater concern for the bodily comfort and physical well-being of animals on the farm than for the home-maker? If the peculiarity is to be explained on the theory that a man does not run after a street car after he has caught it, the reflection on the farmer is a rather severe one. Possibly a more correct explanation would be that the farmer is thoughtless and careless, and that he does not understand.

Here is one sentence from the report that pretty well sums up the story: "On many farms where there is always enough money to buy the latest agricultural appliances there is seldom a surplus to provide the woman, in her productive work, with power machinery that will lighten her physical labor, or running water that will relieve her of the burden of carrying from the pump all water that is used in the household."

The indictment might go further and add that in many places there are no pumps, and that the woman has to split the firewood, milk the cows, look after the poultry, besides paying attention to the wants of a growing and ever-increasing family.

A great many farmers' wives have become insane as a result of the isolated and monotonous life of drudgery they are forced to live. If their husbands had taken half as much trouble to understand them as they take to understand the problems of farm management there would be fewer cases of insanity.

—WESTERN FARM AND HOME.

The Sanitary Engineer has written many articles showing how sanitary and heating engineers could create new business by getting after the farmer, and persuading him to instal these conveniences from a business standpoint; but this article is written to convince our readers that besides there being the business side, there is also the humane side. This country needs robust men, not only physically but mentally; and we must give the woman a show, we must cater to her bodily as well as her mental welfare. Some of our readers may say that sanitary and heating engineers can only go so far, and that wood is the farmer's natural fuel. Well, that may be, but there are all kinds of wood-burning furnaces.

We will just enumerate the conveniences the farmer can secure. He can have light derived from coal oil, gasoline or acetylene, and in thousands of farms electricity can be had. He can have all kinds of power, steam, electricity or gas, the latter generated from various kinds of oil, and also a windmill. For cooking he can have a gas stove installed in exactly the same way, and the same gas water heater to give hot water in summer as is used by those in the city. There are now machines which will actually transform coal oil or gasoline into gas for use with the regular gas stove.

Every one of our readers knows that a modern bathroom can be fitted up and a small sewage disposal plant can also be had. A pneumatic water system is one of the greatest boons a farm can possess. It can be run by gas, generated by a machine as aforementioned, or direct with gasoline. It can also be operated with a windmill, but the most popular is that which is electrically driven. With these systems, as most of us are aware, water can be had "on tap" hot or cold. They are also very efficient fire fighting appliances.

The more one dwells upon the subject the more one becomes enthused with the idea, and must plainly see, as we said above, that it is not only the duty of the sanitary and heating engineer to get after this business from a business standpoint, but also from the humane viewpoint.

Now, let us just picture an ideal scene in our minds. A farm, properly equipped with bathroom, hot and cold water—light (any kind)—no noise, little or no dust, fresh milk, butter and eggs, home-made bread, pure unadulterated cool water, free fresh air from all the four winds of the earth.

This is the practical picture which the sanitary and heating engineer can paint. Whose city wife would not change places with such? Don't all speak at once. Until each farm house is equipped with every convenience such as we have named, we cannot truthfully assert that woman's work is appreciated. Until we provide the female population of our rural districts with what is their due, we cannot claim that we value them or their services to humanity as we should.

Sanitary Methods of Sewage Disposal

This Series Will Deal With the Sanitary Methods of Sewage Disposal in Rural Districts, Where There Are No Drainage Systems—Even Large Cities Are Realizing That Sewers and Drainage Systems Are Not By Any Means Disposal Systems.

FOR a number of years sanitary experts have spent considerable time one way and another, in trying to evolve simpler and more efficient methods of sewage disposal, and no doubt great progress has been made.

Col. Geo. E. Waring introduced a system known as the "Waring System," which is a system of intermittent land treatment. This was and is a very successful method where there is a suitable soil and plenty of area.

In many cases, however, land is too costly, particularly around large buildings, summer hotels and the like, therefore some other method must be resorted to.

Under conditions where there is a scarcity of land, it is found that the biological or bacteriological methods of sewage disposal are becoming more prominent, and indeed it would seem that in a very short period they may become universal.

Speaking from actual experience the writer is convinced that the use of a septic tank is about the best method to date. It is the most natural, simple and most scientific, as well as the most economical, system in use to-day.

Of course when we assert that by the use of a septic tank, one is adopting the best system, we do not mean that the septic tank is all that is necessary. A few days ago the writer was consulted as to the size of pipes required, etc., and found that many people are in the habit of installing 2-inch field tile pipe.

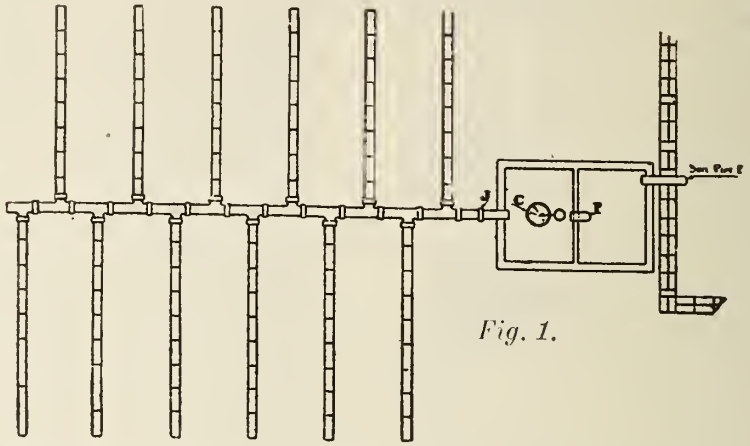
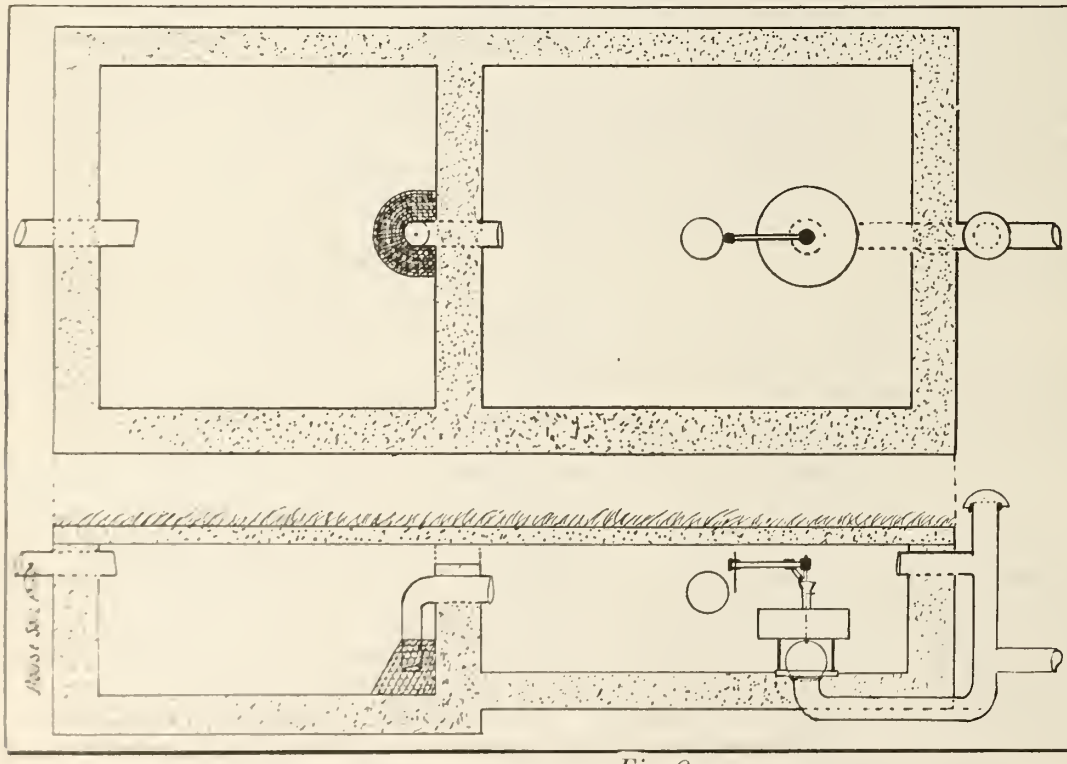


Fig. 1.

One installation was brought to our notice where only 150 feet of 2-inch pipe had been installed to take care of 20 cubic feet of sewage every 24 hours. Such installations cannot do otherwise than fail. Therefore, while the septic tank method is simple, it must be built upon proper lines as also must the irrigation pipe.

Fig. 1 shows a very common lay-out of irrigation pipes. The quantity in lineal feet should be determined by the size of pipe and the quantity of sewage to be discharged every 24 hours. For instance, if the quantity of sewage to be discharged at one time be 20 cubic feet and the size of irrigation pipes be four inches, it would be necessary to lay 260 to 270 ft. of pipe, not counting the main piping which must consist of drain pipes. The joints of the latter should be made



Showing how a septic tank may be built when every inch of height is of consideration. Care must be taken, however, that the same cubic contents are provided in each tank by making one longer than the other as shown in plan and elevation. In constructing a cement septic tank a small quantity of hydraulic cement should be mixed with the ordinary concrete and packed down near the inner side of the tank. One of the main points is to be sure they are water-tight. EN

Fig. 2.

perfectly tight with oakum and cement in the same way as when ordinary drains are laid. The 200 feet of field tile pipe should not be laid close together; there should be left about one-quarter of an inch space between the ends of each pipe, and these open joints should be protected with pieces of broken pipes or stones to prevent the earth from washing into the pipe. Fig. 2 shows a modern style of septic tank fitted with a Quinn valve. Fig. 3 shows a septic tank fitted with a Miller syphon.

Before going further it might be well to call attention to the difference in composition which exists in nearly all instances between city sewage and that from isolated country houses, for this has an important bearing upon the method of treatment adopted. Sewage in general is a complex liquid varying in its volume and chemical composition at all hours. In the case of isolated houses it is slop water, plus the liquid and semi-liquid excretions from human beings and animals. The slop water is composed of kitchen wash water, suds from the laundry, waste water from personal ablutions, dirty water from floor scrubbing and drainage water from stables. This befouled liquid requires purification, no matter whether or not water closets are connected to the house drains. It should be mentioned here that, whatever the sewage disposal system may be, the rain water pipes from country houses should never be connected with the drain carrying the sewage to a septic tank.

Sewage from isolated buildings, when delivered at the disposal point, is generally fresh sewage, because the run of the house sewer is a short one; the sewage is apt to be more concentrated and forms a good deal more scum in the

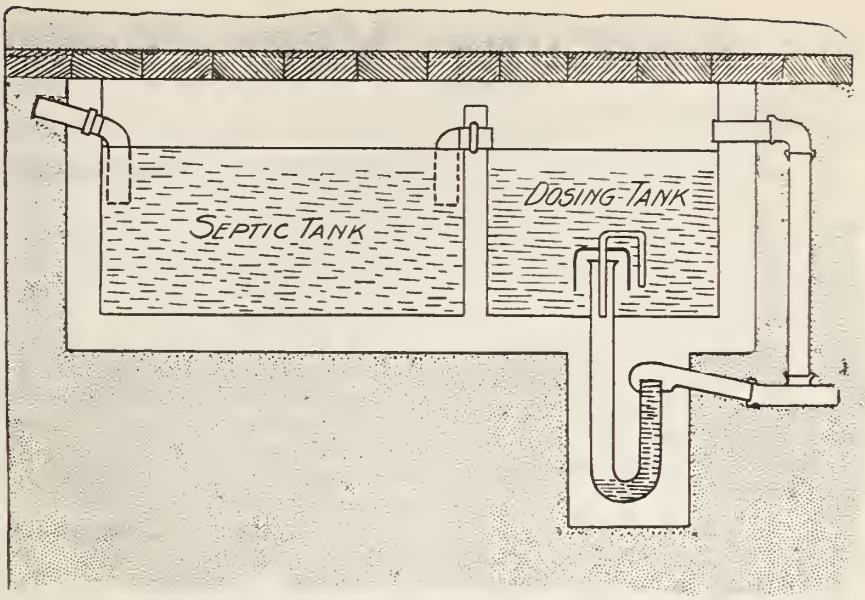


Fig. 3.

tanks. It also contains more solid organic sewage matters in suspension. Hence such sewage absolutely requires some kind of preliminary treatment in order to liquefy the solids and suspended impurities, or at least to hold back the sludge which otherwise is sure to give considerable trouble.

It must not be taken for granted that the septic tank purifies sewage. The septic tank is only a primary means to that end, the real purification or oxidation, which process is accomplished only by bringing sewage or tank liquids into contact with surfaces covered with the aerotic film, and in which the aerotes are kept in active condition by intermittent application of organic wastes and with air.

All forms of land disposal and purification are now known to be based upon bacteriological action. In those systems which generally go under the name of biological or bacteriological methods, we have an artificial treatment in so far as we provide suitable culture or growing places for the bacteria, and thereby increase or promote bacterial action. The purification process itself is a natural process.

The biological methods of sewage purification are based upon the fact that sewage contains numberless bacteria, most of which are not only harmless, but useful in acting upon the sewage matters in suspension as well as in solution.

We have known cases where septic tanks were not working properly, and after a great deal of trouble, it has been found that the housewife, or occupants of a home, have in their anxiety to keep

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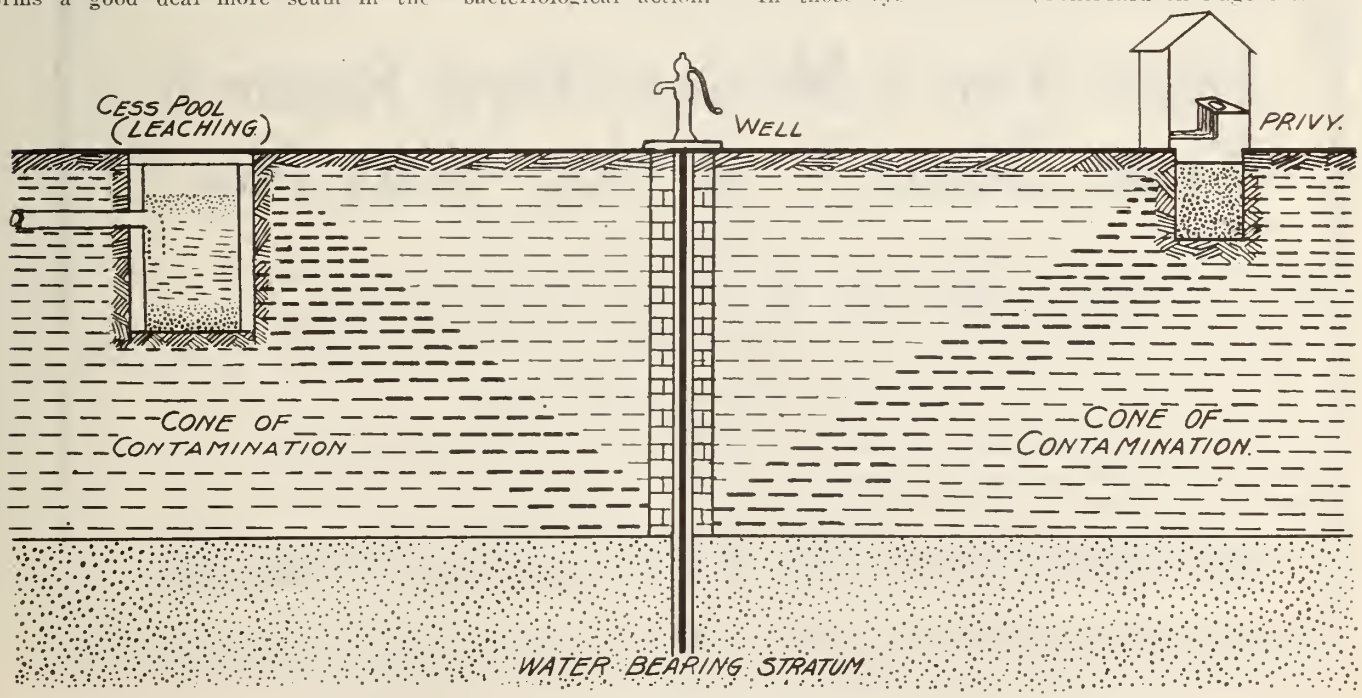

Getting After New Business

Showing How the Country Newspaper can be Used in Getting Business from the Rural Resident—A Significant Despatch.

THE following despatch is not from any seat of war but from a live little town in the good hard wheat belt of Western Canada:

Kandahar, Feb. 11, 1915.
Several farmers contemplate the erection of fine residences this spring and the building trade will be brisk.
The price of wheat is making the farmers smile and an extra big acreage will be put in this spring.

Although the above items convey no news of battle, despite the warlike choice of the town's name, the news is, nevertheless, of the greatest significance to Canadian business men and the public generally. It indicates the actual conditions that prevail throughout the agricultural sections and the small towns of Western Canada. It also points to still further prosperity that will be experienced by the farmers during this year. The farmers of Kandahar can well afford to smile. So can the farmers of every other community, not only in the West, but in every part. The "extra big acreage" that will be planted this spring will yield such a crop of wheat and other farm produce as Canada has never before produced. Weather conditions have already been the most favorable, inasmuch as there has been a plentiful snowfall this winter in all parts of Canada, thus ensuring abundant moisture when spring opens up. The advertising campaign of the Dominion Department of Agricultural, that is now running in some 300 papers covering the whole of Canada, can be depended upon to awaken many farmers in both East and West to a sense of their opportunity and responsibility along the lines of increased production, both by sowing greater acreage and by more intensive crop cultivation.

Several readers of the Sanitary Engineer have mentioned that they had their doubts as to whether the great possibilities for new business existed to the extent we have stated. But regardless of what these half and half pessimists may say we still adhere to our opinion. We have had reports come in from every district throughout Canada, reports which we have sent our own men out to get, and therefore we know that if the sanitary and heating engineer will get right down to business, form some agressive plan, then follow it out in a proper manner, there will be good returns as a result of the efforts put forth. One of our readers paid us a visit a few days ago and stated that he had read the various articles published in the Sanitary Engineer along these lines and had bought a motor cycle so as to get round and interview the farmers. He was more than satisfied that business could be procured, and he had come to Toronto to buy a quantity of goods in readiness. Since his visit we have been informed by him that he has landed several good contracts.

Some of our city readers are considering advertising in the country and farm papers which cannot fail to bring results. Below is a suitable suggestion for an advertisement which could be published in a country paper. One thing about advertising in a country newspaper is, that the advertiser should not crowd the space with a lot of reading matter, but should rather contract for a new advertisement to appear in each issue for a period of several weeks. Then he should make a few calls upon the readers of the paper, have all particulars ready and be in a position to talk business. In all arguments get the women folk interested; show how labor can be lightened and how hired help can be made more efficient. It is not good policy to argue that less help will be required, but rather that more work can be accomplished by the help already hired.

There are thousands of farmers who have become attached to their hired help and to talk of being able to dispense with such help will not always have the desired effect. Moreover such an argument would create ill feeling towards the person trying to create the new business.

Have You a Modern Bath Room in Your Home? If Not, Why Not?

We can equip your farm, home and buildings with every city convenience. Heating, Lighting, Sewage Disposal System, Bath Room, Hot and Cold Water at the Tap, Pneumatic Water System and Efficient Fire Protection.

How to get full information

Call at our establishment and we will show you how or drop us a post card and we will call upon you at your convenience.

RAY BROWN & CO., Sanitary and Heating Engineers

Wide-awake sanitary and heating engineers are looking for business from the farmers and finding it. This advertisement will produce enquiries and also pave the way for personal calls.

False Economy

Plenty of Work in Every City—Regular House to House Inspection is Necessary—The Only Means of Keeping Sanitary Appliances Up to Date—Public Would Benefit and Journeymen Would be Provided With Regular Work.

ONE of the worst types of false economy to come to our notice since the war broke out is that of civic authorities trying to cut down expenses by discharging their plumbing inspector.

We venture to assert that if there happened to be a practical man on the board of health this false economy would not be resorted to. If there is one civic official more than another who can make his services of real value that man is the plumbing inspector, providing, of course, that he be a practical man. We do not refer to men who are not practical mechanics, but who are holding positions as plumbing inspectors. Such men should never have been given the positions they hold, and they are, therefore, a liability, whereas a city employing a practical man has in him a gilt-edge asset.

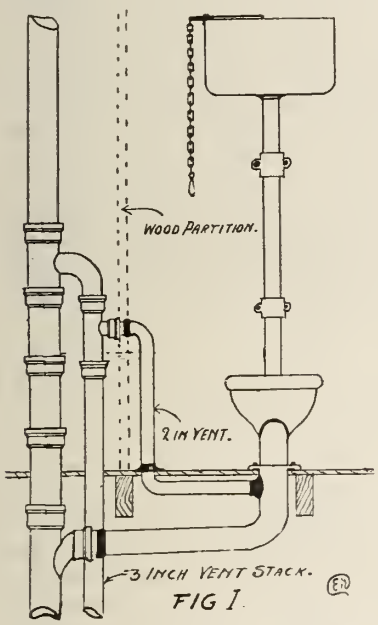

FIG 1.

Almost every city in Canada is faced with the problem of the unemployed, and is actually hunting up almost every fool proposition it is possible to run up against, all with a view of giving work to the unemployed. Governments are being interviewed, and work is being created which will be a burden upon the people for many years to come. Such work is acknowledged by all to be costly, too costly, in fact; but "it is to give employment to those out of work," they say.

No doubt it is, and further, it is doing work which is in many cases not a thousandth part as necessary as work which requires doing at our very door.

For instance, why not keep the plumbing inspector in harness by instituting a regular house-to-house inspection of all plumbing? Why not see that all w.c. tank valves are in order; report upon the condition of every house, and where installations are found out of order make the owners put them in order? There are thousands of houses in our large cities which are not equipped with proper sanitary arrangements, and are not connected to the main sewers which pass their door, and yet there is little or nothing being done to remedy the matter.

If the various municipalities are as anxious as they would lead the public to believe, why not raise money to assist the small property-owners to make the necessary improvements, thus giving work to every journeyman plumber and helper within their gates?

Such work is necessary. Simply because the country is at war is no reason why they should allow matters of such vital importance to be neglected.

Another dangerous feature of the course adopted in discharging the plumbing inspector is that it is thereby rendered quite easy for anyone to put in cheap work of an inferior nature, whereas the plumbing inspector, if retained, could devote his attention to the remodelling of by-laws. He can also keep an eye on the repair work being done. Plumbing inspectors are not necessary to examine and inspect new work only, though this seems to be the impression which some of our city fathers have.

By way of showing the effect of regular inspection of plumbing installations we again reproduce a cut (Fig. 2) which has appeared before. Fig. 1 shows a certain installation which was passed by a qualified inspector, and was in every detail installed in accordance with the by-law in force at the time. Several months later, a tenant required a sink to be installed and consulted a person posing as a sanitary engineer. The outcome was the installation shown in Fig. 2.

No doubt the person installing the sink knew very well that there was no periodical and systematic inspection of existing plumbing, and, not knowing how the work should be done, simply botched the whole outfit. No one could find out who installed the sink, and after two years or so the tenants changed, with the result that more changes had to be made in the plumbing, and in that way this botched installation became unearthed. We could cite scores of instances where bathrooms have been remodelled, new fixtures installed and fitted to poor piping, traps twisted out of shape, putty joints, and a thousand and one schemes resorted to. The writer once came across a job where there had been an old copper-lined enclosed bath and pedestal w.c. bowl, with horn vent and overhead cistern. The owner promised the tenant to install a lavatory and fit up the whole bathroom anew. This is what happened as an excuse for remodelling:

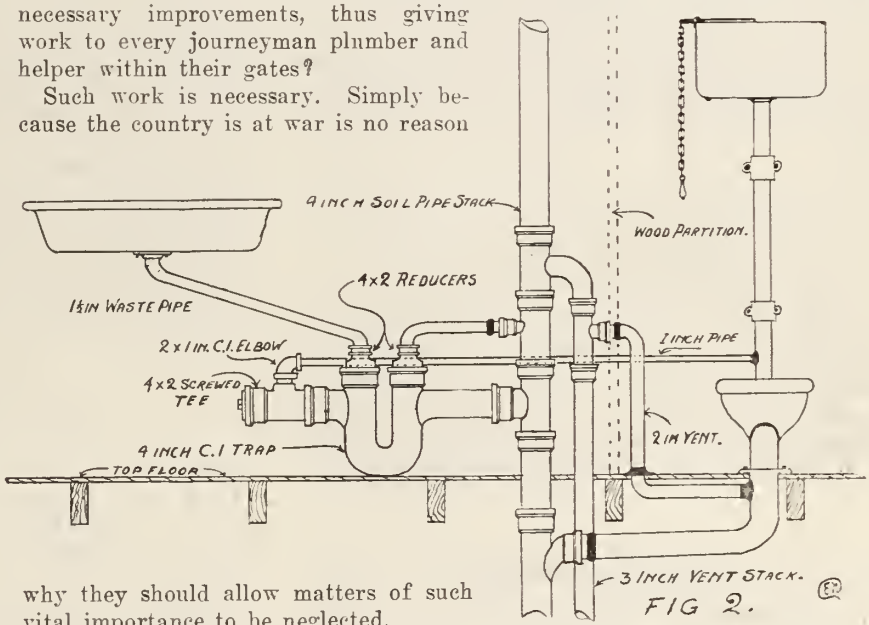

FIG 2.

A low down tank was fitted to the w.c. bowl, cast iron enamelled bath was

(Continued on page 25.)

The Sanitary Engineer

Plumber and Steamfitter of Canada

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Circulating amongst Sanitary, Heating and Ventilating Engineers, Gas Fitters, Sanitary Inspectors, City Engineers, Boards of Health Architects, etc.

TORONTO, MARCH 1, 1915

The Farmer is King

THEN his wife should be a Queen, not a hewer of wood and drawer of water. She should be queen of a sanitary home, she should be surrounded by every appliance of comfort which sanitary science has evolved.

It is the duty of the sanitary and heating engineer to see to it that every farm and rural residence is equipped with all necessary fixtures and appliances which will enable those living in rural districts to enjoy all and more than the city dweller.

The farmer is king. Wheat is golden, more so to-day than ever in the history of the world. The farmer it is who will produce more real wealth for several years to come, and he will have surplus money.

Separate the farmer from the idea that he must bank his money and show him what comforts he can enjoy for a given sum.

In England, "plumbers, painters and glaziers" is the title of quite a number of firms, which means of course that there are men who are plumbers, and men who are painters working under the same management. But to-day we should have more sanitary and heating engineers who can paint—paint pictures of lovely bathrooms and sanitary kitchens, etc., in the mind's eye of the farmer and his wife.

False Economy

UNDER the above heading appears an article which refers particularly to the question as to the advisability of discharging plumbing inspectors. We hope every reader will take this matter seriously.

The fact is that at no time in history has it been so necessary that money should be spent freely, but at same time more wisely than is the case to-day. The hoarding of money should be discountenanced by every one. Just imagine! During last year there was nearly $40,000,000 increase in the savings bank deposits, and yet the country's business was practically at a standstill, particularly the building trade. Now, what sanitary and heating engineers should do is to commence a little housecleaning campaign amongst themselves. Show the city fathers of every city, town or village that to partially solve the unemployed problem they should inaugurate a thorough house to house inspection and make it an annual inspection; and as sanitary appliances were found to be out of order, instruct owners to have them put right. This would create legitimate work for every journeyman sanitary and heating engineer in Canada and would be far more feasible than finding money for schemes, the benefits of which will not be apparent for years to come. Not only would the inspection of all plumbing be a boon to the trade at this period because of there being so many men out of work, but it would as we have pointed out, tend to prevent irresponsible persons engaging in the the trade, and installing faulty work, because, these persons knowing that their work would be inspected at some period of the year, would not run the risk of being brought to task. While speaking of this matter we also feel that it would be a good move to adopt a rule that all work coming under the jurisdiction of the plumbing inspector should have the name of the person or company's name to it, so that in case the work was of a faulty nature, those doing it could be held responsible.

An Early Advertiser

ONE of the earliest advertisers on record was Noah. Day after day he announced the fact that there was going to be a great flood, and that in preparation for the same he was constructing an ark, on which a few people with good characters might engage passage. He got the merry ha-ha and even when it did begin to rain, his fellow townsmen said they guessed that it wasn't going to be much of a shower anyway. Again Noah advertised the fact that state-rooms could be engaged on the ark, but as no one applied for them he filled them up with elephants, ant-caters, camels and such like critters.

It was not until Shem and Ham pulled in the gang plank that the people realized that Noah had not deceived them with his announcements. Then there was a rush for the box office, but it was closed and the ark was beyond the three mile limit. There was terrible excitement in town that night, but next morning all was quiet under six fathoms of water.

There isn't much of a moral to this except it be that when a good, honest, reliable man advertises people should believe him.—*Printer and Publisher.*

The Trade Should Advertise

ONE thing the sanitary and heating engineer does not pay a great deal of attention to is advertising. However, we believe there is an excuse for this state of affairs to some extent. At least there has been, because as a matter of fact, sanitary and heating engineers are to some extent in the same class as the medical faculty. In the past they were very seldom expected to look for work it always came to them. To-day things are a little different, particularly in large cities, and we believe the time is come when the sanitary and heating engineer must pay some attention to the advertising problem.

If he desires to get any of the farmers' money, he should advertise in the country newspapers. We have shown a simple suggestion on another page, which no doubt would draw a few inquiries if inserted in some country-town local newspaper. These replies would at once put one in touch with prospective customers.

Proper Heating of the Home

AT a meeting of the Toronto City Council recently, Alderman Ryding moved that all builders and contractors be made to install sufficient radiation and heating plants in all buildings.

This is certainly a move in the right direction, and if the project is carried out, there will be many thousands of tons of coal saved for the citizens of Toronto, homes will be made more comfortable and healthy. There is no section in the make-up of the homes which is neglected as is the heating and ventilation of buildings such as residences, and the worst feature is that such poorly heated buildings are generally those which the middle class have to buy. The Sanitary Engineer has been advocating that some law should be put into force which would require that all specifications be submitted to the board of health, before such appliances be installed. We, therefore, hope this move of Alderman Ryding's will be put into effect at some future date, the sooner the better.

Wanamaker Ideals

JOHN Wanamaker has been a big man in the retail trade of Philadelphia for a good many years. He is in fact recognized as one of the retail kings of the American continent. What he says about the conducting of a retail store is therefore always worth more than a passing consideration.

In outlining for the benefit of his staff his policy for the year 1915, he advises Safety First, holding that this is a daily duty that every person should reverently perform in the interests of his customers. He assumes that no one connected with any business will be lacking in politeness; he points out that there should be no trickery in the palming off of second-class goods as first, and that honest advertising is one of the first considerations in any permanently successful business. "From every department," he says, "we have barred out deception, dishonesties, delusive statements, disguised goods, and pilfering prices. Our store will play fair or not at all."

In those last few words you have the ideals of the man. The methods that John Wanamaker has used and is still using to build up a business into millions, can be applied to-day by every sanitary and heating engineer in his business of thousands.

Production of Lead

THE report of the British Columbia Bureau of Mines on mineral production, 1914, gives some interesting statistics regarding the production of lead in the province of British Columbia.

Up to the time of the declaration of war it looked as if the 1913 output of 55,000,000 lbs. of lead — the highest annual production in the Province in eight years—would be exceeded in 1914. For the six months ended June 30th the average quantity of lead received at the smelting works at Trail had been 4,366,000 lbs. a month; then came July's total of 5,682,000 lbs., followed by 5,082,000 lbs. in August, which last-mentioned amount in being smaller showed the effect of the closing of several of the mines during that month. The remaining months of the year did not see a return to ordinary output conditions of the mines in Ainsworth, Slocan, and Nelson Divisions, though there was an increase in lead-ore receipts from the Sullivan group, East Kootenay, owned by the Consolidated Company, which to a considerable extent compensated for the decrease in those from the other parts mentioned. The total lead produced can not be placed at more than 52,425,000 lbs., which was 2,940,000 lbs. short of the production in 1913. Under the circumstances, it is a matter for congratulation that the falling-off in output was not greater.

Editorial Briefs

The harder the toil the sweeter the rest.

• • •

Very few jobs are worth the having if they are not sought for.

• • •

The reason why so few sanitary and heating engineers are rich is because work has oftener come to them than otherwise.

• • •

One of the hardest things for the sanitary and heating engineer to become is a business man, and a salesman. As a mechanic he's without a peer.

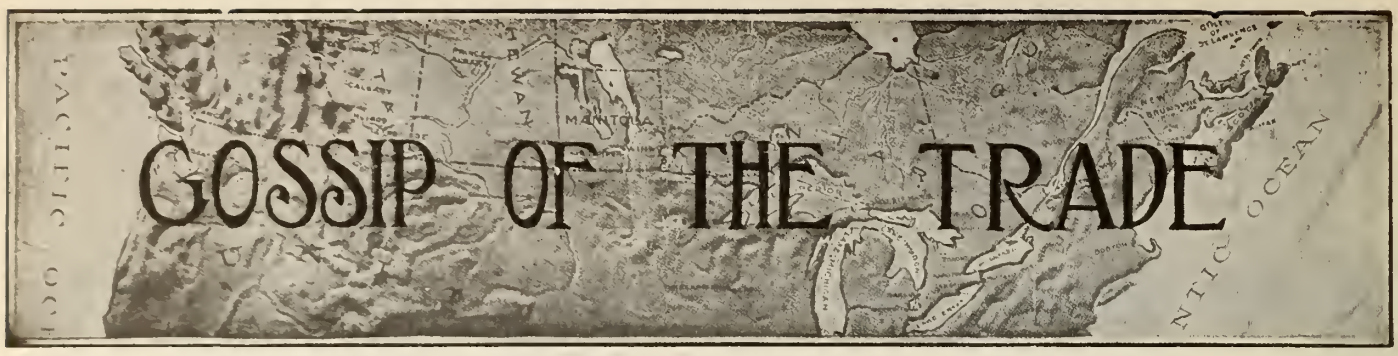
• • •

One of our readers stated recently, "that he'd never looked for a job yet," and he felt it would be the hardest task he'd ever tackled.

• • •

Did you tackle that trouble that came your way,
With a resolute heart and cheerful?
Or hide your face from the light of day,
With a craven soul and fearful?
Oh, a trouble's a ton, or a trouble's an ounce,
Or a trouble is what you make it;
And it isn't the fact that you're hurt that counts,
But only how did you take it?

—The Business Philosopher.



Ontario Boiler Inspection.

The Ontario Boiler Inspection Department has decided to take over control of the inspection of all boilers in use in the province. Legislation to this effect will be introduced during the present session. This stand is taken as a part of the Government policy to prevent any further boiler accidents, and means the elimination of all "inspections" by the engineers running the boilers. At present the Factory Act requires that every boiler be inspected annually, either by an engineer employed by the boiler insurance companies or by an engineer with five years' experience. Where a boiler is not insured the man running it has generally inspected it himself.

Under the new bill, **all boilers except those used in private residences must be inspected internally and externally under operating conditions at least once each calendar year.** They must not be operated in excess of the pressure determined by the regulations and stated in the certificate of inspection issued by the department. The inspections will be made by departmental inspectors, or by insurance company inspectors as heretofore, except that all reports of inspections made by the latter must be submitted to the chief boiler inspector, under whose supervision the insurance companies will work. The reports sent in by the insurance companies will be in condensed form, and will be filed at the department. Under the proposed bill, there is no intention to take any business from the boiler insurance companies, the idea being to insist that all boilers are inspected by a qualified inspector, which has not always been the case formerly.

Principles of Hot Water Heating.

About thirty-five gas men met together recently in the Employees' Education Lecture Room of the Consumers' Gas Company, Toronto, to hear Mr. E. S. Stack, president of the Stack Gas Water Heater Company, give a lecture on the principles of water heating.

Mr. Stack illustrated his lecture by numerous lantern views, taking his hearers through the history and development of the many types of water heaters, and by well-defined remarks explained the reasons why so many of the old type of water heaters failed to give the satisfactory hot water service so desired by the consumer.

Elected Alderman.

W. Crowder, 1305 Wellington Street, Verdun, Que., was elected an alderman in the recent municipal elections by a majority of 12.

Taken Over Business.

It will be of interest to readers of The Sanitary Engineer to know the Steel Trough and Machine Co., Limited, Tweed, Ont., have taken over the equipment, patterns and good-will of the Toronto Steel Clad Bath Co., and are now manufacturing this line at their Tweed factory.

To Heat Houses Properly.

At a meeting of the Toronto City Council recently, Ald. Ryding took up the question of the necessity to compel builders to put proper radiation and heating plants in new houses, and he moved that the building by-law be amended to have this done.

Appointed Sales Manager.

The friends of W. G. Downs will be interested to know that his company, the B. O. T. Manufacturing Co., Ltd., Toronto, have seen fit to promote him to the position of Canadian sales manager. Mr. Downs has no doubt made good, and The Sanitary Engineer wishes him success in his new responsibility

Faulty Furnaces, Etc.

Toronto's City Architect, W. W. Pearse, addressed the members of the Toronto Builders' Exchange on the revision of the building by-laws of this city.

"I am trying to formulate a set of by-laws which will be by the people and for the people, and then I expect the people to stand by them."

He explained that he is giving special care to the fire prevention regulations. He gave figures to show that many fires were caused by faulty chimneys, furnaces and stoves, and electric wiring. Canadian cities showed heavier per capita fire losses than American cities, as a rule.

MONTREAL NOTES.

Started in Business.

W. G. Bailey, formerly foreman for George McKnight, 91 Inspector Street, Montreal, has opened up for himself at 145 Bleury Street, heating and plumbing.

Over 200 Present.

The Master Plumbers' Association of Montreal and vicinity held their annual euchre and dance in the Majestic Hall, Montreal, on Tuesday, February 9. The affair was one of the biggest successes in the history of the association, and it is expected that a big sum will be handed over to the Red Cross Society. There were over 200 present.

Honors for a Member of the Craft in British Columbia.

Some time ago we pointed out to our readers that quite a number of sanitary and heating engineers had been honored by being elected to fill positions in civic life.

We have just been informed of another member being appointed to the position of police commissioner. A. C. J. Weeks, manager of Weeks & Co., sanitary and heating engineers, of Vancouver, B.C., has just been appointed one of the police commissioners of that city by the Provincial Government.

Mr. Weeks, better known as "Bert" Weeks, in an old Toronto boy, but has been long a resident in Vancouver where his many virtues have endeared him to a wide circle of friends who feel sure he will make good in the public service, as he has done as mechanic and employer.

We have stated time and again that in our opinion, no other craftsmen can be of as great a service to the public at large as can the sanitary and heating engineer. The idea of uplifting the calling from a trade to a profession is worthy of note.

No man can be really successful in this line unless he really loves his calling. There are so many things which enter into the life of the sanitary and heating engineer, other than the business elements that it is absolutely necessary that

each man employed in it, should be thoroughly in sympathy with sanitation and the general welfare of humanity at large.

NEW LICENSING BY-LAW.

The Board of Health of the City of Toronto will at least be sure of having less trouble with poor workmen than they have had in the past. This will be the result of the institution of the by-law which regulates the licensing of sanitary engineers.

We have pleasure in publishing the new by-law as follows:—

No. 90—A By-Law.

To amend By-law No. 23, with reference to the licensing and regulating of plumbers.

The Board of Commissioners of Police for the City of Toronto enacts as follows:—

I.

By-law No. 23, respecting the issue of licenses for the City of Toronto, is amended by striking out clauses 34a, 34b, 34c and 34d, under Section XXXIV., and by substituting the following therefor:—

XXXIVa.

Every plumber carrying on his trade, business or calling in the City of Toronto shall register his name and address at the office of the Plumbing Divisions of the Department of Public Health in the said city, under such rules and regulations as the said department shall prescribe, and receive a certificate that he is entitled to a license.

XXXIVb.

No plumber, who is not already licensed and recognized as in good standing with the Department of Public Health, shall be entitled to receive a certificate that he is entitled to a license unless he passes an examination to the satisfaction of an authorized examining board composed of the Medical Officer of Health, or one of his staff, and two plumbers, one to be a master plumber and one a journeyman plumber of not less than ten years' experience, to be named by the Medical Officer of Health, and the chairman of the Local Board of Health.

XXXIVc.

Upon and immediately after the passage of this by-law, every person desiring such certificate shall file, with the chief of the division of plumbing and drainage of the Department of Public Health, a petition in writing giving the name of the applicant, and in case of a partnership, the name of each member thereof, together with the place of business, and asking for a certificate that he is entitled to a plumber's license.

XXXIVd.

Any change of the firm or location of the business of the applicant or his firm shall be promptly reported to the chief of the division of plumbing and drainage and also to the issuer of licenses.

XXXIVe.

Every applicant for a plumber's license shall file with the issuer of licenses the certificate hereinbefore referred to, and shall thereupon be entitled to a license as a plumber, for which license such person shall pay each year at the time of the issuing thereof such sum as shall be fixed by by-law of the council of the city.

XXXIVf.

A partnership of two or more persons desiring to carry on the business of plumbers may do so upon each person obtaining the license hereinbefore provided for.

XXXIVg.

Every such license shall be for the year current at the time of the issuing thereof, which shall expire on the 31st of December next succeeding the date of the same.

XXXIVh.

Upon satisfactory evidence furnished to the Board of Commissioners of Police that any plumber has been twice convicted of any violation of the provisions of this by-law, or of any of the by-laws respecting plumbing, drainage, sanitary matters or waterworks, the Board of Commissioners of Police may declare the license of such plumber forfeited and thereby such license shall be cancelled.

XXXIVi.

Any plumber whose license shall be declared forfeited by the said Board of Commissioners of Police, as hereinbefore provided, shall not be again entitled to a license until the said declaration of forfeiture shall be revoked by the said board.

XXXIVj.

No person shall carry on business as a plumber in the City of Toronto unless he is the holder of a license issued as hereinbefore provided, and is of the full age of 21 years.

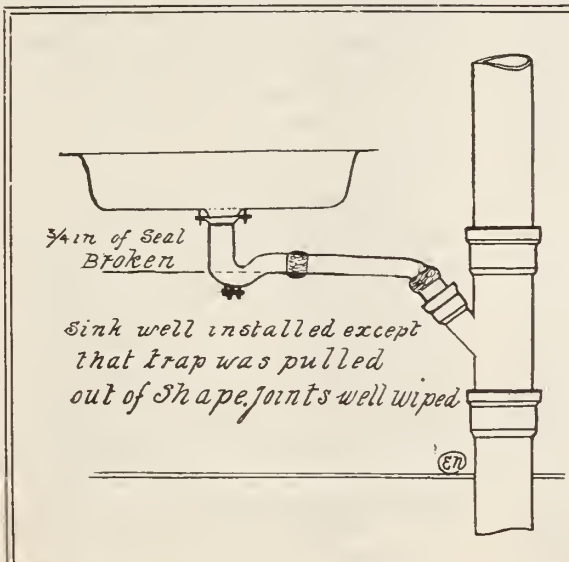
H. C. HOCKEN,
Chairman Board of Police Commissioners.
H. J. GRASETT,
Chief Constable.

FALSE ECONOMY.

(Continued from page 21.)

fitted to the old trap, which by the way was 1¼-inch in size; the lavatory waste was connected into the horn of the w.c.; then the trap of the sink in the kitchen was vented into the opening in the stack, which had been previously used as the vent from the w.c. horn to the stack. Now would any self-respecting sanitary engineer call that a good job? No, not by any means; but such work is going on, and will go on more than ever unless the plumbing inspector is kept at his post. We do not for one moment think any respectable sanitary engineer would do such work, but on account of it being possible in so many cities for any one to obtain a plumber's license without having first to pass an examination, and because work is so scarce, such poor work will be done, and those doing it will not care if they never see an inspector. Such work being done is moreover a handicap to the conscientious sanitary engineer, and tends to reflect prejudicially upon the whole craft.

We certainly cannot speak too strongly against the discharging of the plumbing inspector. It is, as we stated in our last issue, like killing the cat to save the milk, and we sincerely hope the craft in every town and city will take the matter up and see to it that regular inspection be made of all sanitary installations; that the plumbing inspection department do this; and no doubt by so doing there will be found lots of work which should be done.



If all plumbing were inspected every year, such work as here shown would be easily traced to the person doing it, and the public would not be fleeced by incompetent men.

Analysis of Can. Sanitary Engineering By-laws

This Series of Comments, Relates to the Sanitary Engineering By-Law Number 449 of the Town of Oakville, Ontario—In Many Respects this By-law is Far in Advance of Some By-Laws Now in Force in Larger Cities.

THE previous articles have proved of such interest to so many of our readers that we propose to take up another by-law and comment upon it in a general way. At the same time repeating the by-law clause by clause.

RESPECTING THE CONSTRUCTION OF HOUSE SEWER CONNECTIONS AND PLUMBING.

Whereas it is desirable in the interests of public health to provide a systematic and proper method of constructing house sewer connections from the public sanitary sewer now laid or to be laid in the town of Oakville, and to establish regulations for the proper construction of plumbing and sanitary fixtures and appliances to be connected with such sewers;

Therefore the Municipal Corporation of the Town of Oakville enacts as follows:—

INTERPRETATIONS.

Clause (1)—The words "clerk", "construction." "engineer," "lot," "owner," and "street" shall in this by-law, so far as the context allows, be construed in accordance with the interpretation section of the local improvement sections of the Municipal Act.

This clause is not one requiring any comment.

APPLICATION FOR PERMIT.

Clause (2)—Every owner shall before connecting any sanitary or any plumbing or drainage appliances or fixtures upon his lot or premises with any public sanitary sewer and before permitting any sewage, water or matter to drain from his lot or premises into such sanitary sewer, file with the clerk a written application and agreement upon a blank form perscribed by the council, for a permit to make such connection or to establish such drainage.

Clause (2) is also of a general nature though important enough in itself, and distinctly forbids the connecting of any drain or waste from either lot, land or fixture until a proper application has been made and a permit issued.

FORM OF APPLICATION.

Clause (3).—Such application shall describe the work proposed to be done, the premises to be drained and the drains, plumbing, appliances and fixtures to be connected with or drained into the sewer.

Clause (3) is of more importance to the sanitary engineers in general. It does not actually demand that a plan be filed showing the position of the various fixtures. The Sanitary Engineer would very much prefer that a plan of all drain and soil pipes be required with each application, because such a demand could only be conformed to by practical men of experience.

ENGINEER'S ESTIMATE OF COST OF BRANCH DRAIN.

Clause (4).—Upon receipt of such application the clerk shall deliver the application to the engineer who shall ascertain the location of branch drain or the junction pipe for such branch connection, if any, and if there is no suitable branch drain, shall estimate the cost of constructing a branch drain to comply as nearly as may be with the requirements of such application. Such estimate shall include an engineering fee of one dollar for each single connection and two dollars for each double connection to cover the cost of supervision, and the necessary measurements and records.

This clause is simply one which refers to the necessary fees as are also clauses 5 and 6 which read as follows:

PAYMENT FOR BRANCH DRAINS.

Clause (5).—If there is no suitable branch drain as aforesaid the owner shall pay to the treasurer of the corporation upon a warrant from the clerk, the amount of the estimate aforesaid.

ADJUSTMENT OF COST.

Clause (6).—Upon the completing of such branch drain the engineer shall report to the clerk the amount of the actual cost of such branch drain including the engineering fee as aforesaid. If the actual cost shall exceed the estimate of the engineer the owner shall forwith pay to the treasurer, upon a warrant of the clerk, the balance of such cost. If the actual cost shall be less than the estimate of the engineer the treasurer shall likewise refund the balance to the owner upon a warrant of the clerk.

SUPERVISION OF WORK.

Clause (7).—All work shall be executed under the direct supervision of the engineer and in accordance with the specifications for labor and materials under which the public sewers were constructed so far as they are consistent with this by-law.

GRADES.

Clause (8).—Proper lines and grades will be given by the engineer before the commencement of the work.

It will also be seen that clauses 7 and 8 are general, except that it is stated in clause 7 that the engineer will supervise the work. This would be all right provided the town engineer has had practical experience in plumbing work; we do not, however, favor the idea of allowing any town engineer, who is nothing more or less than a civil engineer, and whose experience in plumbing construction is very limited to act as inspector. Many small towns expect too much from their engineer, and try to economize on salary, by having their engineer fill the position of plumbing inspector. They pay more for their domestic engineering in the long run.

PIPES.

Clause (9).—The house drain from a point three feet outside of the house to the street line shall be of first quality salt glazed vitrified earthenware pipe, unless laid less than three feet deep or unless in ground liable to settle, in which case it shall be of heavy cast iron, or incased in 6 inches of good concrete cement, in the proportion of 1 cement, 2 sand, and 5 finely crushed stone. The first three feet outside of each building, and the two feet through the wall of such building, shall also be of heavy cast iron pipe, weighing not less than twelve pounds to the lineal foot of 4-inch pipe. Until plumbing connections are actually made, the inner end of the cast iron pipe shall be sealed with a disk of wood and portland cement mortar. Vitrified earthenware pipe

(Continued on Page 32.)

Consider Specialties

To Create New Business Requires New Lines — The Manufacturer of Specialties Deserves More Recognition From the Sanitary and Heating Engineer — Specialties of Merit Pull Business and Establish a Reputation Not Only for the Manufacturer But Also for the One Who Installs Them.

TO-DAY, more than ever before, the sanitary and heating engineer is face to face with this question: "How can I keep my men employed? The building trade is as dead as a door nail—what can I do?"

Well now, reader, it is not yet quite so bad as one may at first imagine. We have been telling the trade to get after the farmer, and we are going to keep on doing so; but, there are those sanitary and heating engineers, who cannot for various reasons get after the farmer. It is for such we are writing this article.

First of all we will take up the question of heating specialties. Everyone knows that every pound of coal represents so many units of heat. A few years ago it was acknowledged that to be able to conserve 47 per cent. of heat units out of every 100 was getting fine results. Then along came the score-and-one fuel savers, smoke consumers, etc., and brought the figures up to 57 per cent., or thereabouts. After that, along came various forms of air vents, and a score of other specialties, all of which have played their part in this age of progress. To-day we have smokeless, down-draft boilers, automatic air-valves, which **are** automatic; we have vacuum systems, **have**, not simply supposed to have; we have radiator traps that **do** trap steam and return water only, and we have automatic thermostatic temperature controlling systems, heat generators and heat regulators, economizers; in fact, the heating engineer scarcely knows what there is at his disposal. And it all means this, that a few years ago 43 per cent. was good; to-day 86 per cent. is only fair.

In common shop talk, all this means that there are heating specialties on the market to-day which will make the coal last just about twice as long as it did formerly. Not only this, but when coal is saved, time also is saved. There is less furnace cleaning, which means less wear and tear of furnace, fewer ashes to sift and carry out, less attention required and more uniformity of temperature.

A few years ago the very best authority on heating would have said that a one-inch pipe could only serve a hot water radiator up to 40 sq. ft. in an ordinary job; to-day this size can easily be made to heat twice that quantity by the use of certain specialties. Not many years ago it was impossible to properly control the checks and draft doors of hot water furnaces; to-day it is a common thing, in a sense, though not one hot water furnace in 100 is so equipped; and why? Simply because the heating engineer has not come to recognize the heating specialty man, in spite of the fact that the heating specialty man has spent his life in perfecting a necessity. He saw that it was a necessity to get more service from coal than was being got, and to-day, as we said before, as high as 50 per cent. more efficiency is derived from coal than was found possible a few years ago.

Next come the thousand and one sanitary specialties.

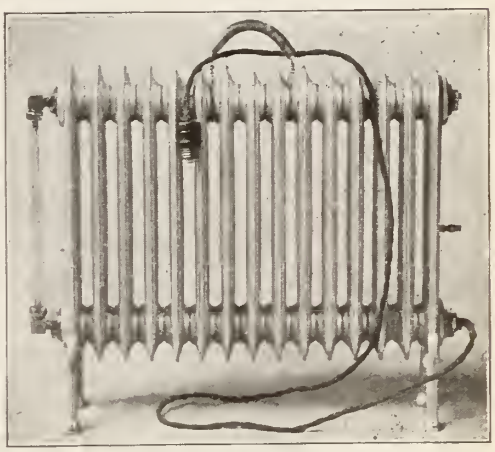
The tendency has been to go for the cheapest possible job, and no doubt there have been some cheap, scamped jobs installed. When one hears of 5 fixtures being put in, all N.P. brass goods at that, for $143, we can vouch for the cheapness. Any sanitary engineer who lets an owner get away for $143 is not honest. What we mean to say is this, that it is not honest to let any man waste $143 on a system when at least twice that amount should have been **invested**. The main idea is that every sanitary and heating engineer should see that the buyer gets service from his investment.

The shower is a specialty to some extent, but it's a necessity, and some kind of a show can be bought from $10 up and be good value. Gas water heaters are another line which should be pushed more than they are. Just recently one of our readers stated that he was working up a campaign with a view of featuring gas water heaters. We mean, of course, **gas water heaters**, not **gas eaters**; there are too many of the latter on the market. Now is the time for this line, and to **show** a customer that you can heat 30 gallons of water in so many minutes, for a few cents, will not only result in the sale of a gas water heater, but in 9 out of 10 times is going to result in other business. This is the day of **show me**, therefore sanitary and heating engineers must be ready to **show**.

NEW GOODS.

Another specialty deserving the attention of sanitary and heating engineers is that of an electrical steam radiator, cut of which appears on this page. These radiators are made in regulation size, and are figured in the same way as any other steam radiator.

The method of construction is simple. It is like the ordinary radiator in appearance. In the bottom water way of the radiator is placed a tube, and with-



Electrical Steam Radiator.

in this tube is inserted another, some three-sixteenths of an inch smaller. A resistance coil, properly insulated, is enclosed within the smaller tube. In the radiator is placed a small quantity of water—from one and a half to three quarts, according to the size of the radiator. The water reaches the inner tube containing the heat-coil through an opening in the larger tube. As soon as the current is turned on, the thin film of water becomes heated and circulation commences.

New Threading Tools.

One of the most recent tool catalogues to be issued is that of the A. B. Jardine & Co. It is really a fine little work of art, and should be in the possession of every sanitary and heating engineer in Canada. It describes the various line of "time-savers" in pipe-threading tools and extra repairs. These books can be procured free from A. B. Jardine & Co., Hespeler, Ont.

Practical Course for Sheet Metal Workers

ARTICLE No. 12 OF SERIES

By CHARLES SEIVERS

IN the previous article the elevations and plans of a box were illustrated. In this article the patterns of different parts are shown.

First the pattern of the front elevation, draw a straight line as A-A, from this line and at right angles or square to it, also a distance apart equal to the length of front. Then draw two lines, cutting them off at the height required. Next draw a line connecting them at this point. this will give pattern less seam allowance, etc.

On bottom or line A-A, allow single edge to receive bottom, on top or line parallel to A-A, allow edge to cover wire reinforcing. On the two ends allow two edges or double allowance to receive edge on end. The rear elevation being same the one pattern does for the two.

The pattern for the end is developed in the same manner, the allowance for seams on the bottom is single edge to receive bottom. A wire allowance will be necessary at top, but only a single edge on sides to receive front and rear pieces. *These seam allowances are illustrated in the full size details of corners, also seam on end partly finished and completed.

Having obtained patterns of body, next is the bottom.

To lay out bottom draw a line equal to length of box, at each end draw lines square with it and of a length equal to width of box. Connect these lines thus getting outline of the bottom, next allow on four sides the seam allowance, this will be a double allowance similar to edges allowed on front and rear portions of body.

The portions are marked out in the same manner, a small edge being allowed on bottom and two ends to allow of being fastened or soldered to body of box and a wire allowance at top to receive wire reinforcing. The length and height, etc. of partitions are taken off plan and sections respectively.

In patterns shown here the body of box would be in four parts and bottom separate if necessary in laying out, the front part can be marked out as shown, and from line A-A mark out pattern of bottom and from line B-B on bottom mark off rear portion as shown from line B-B.

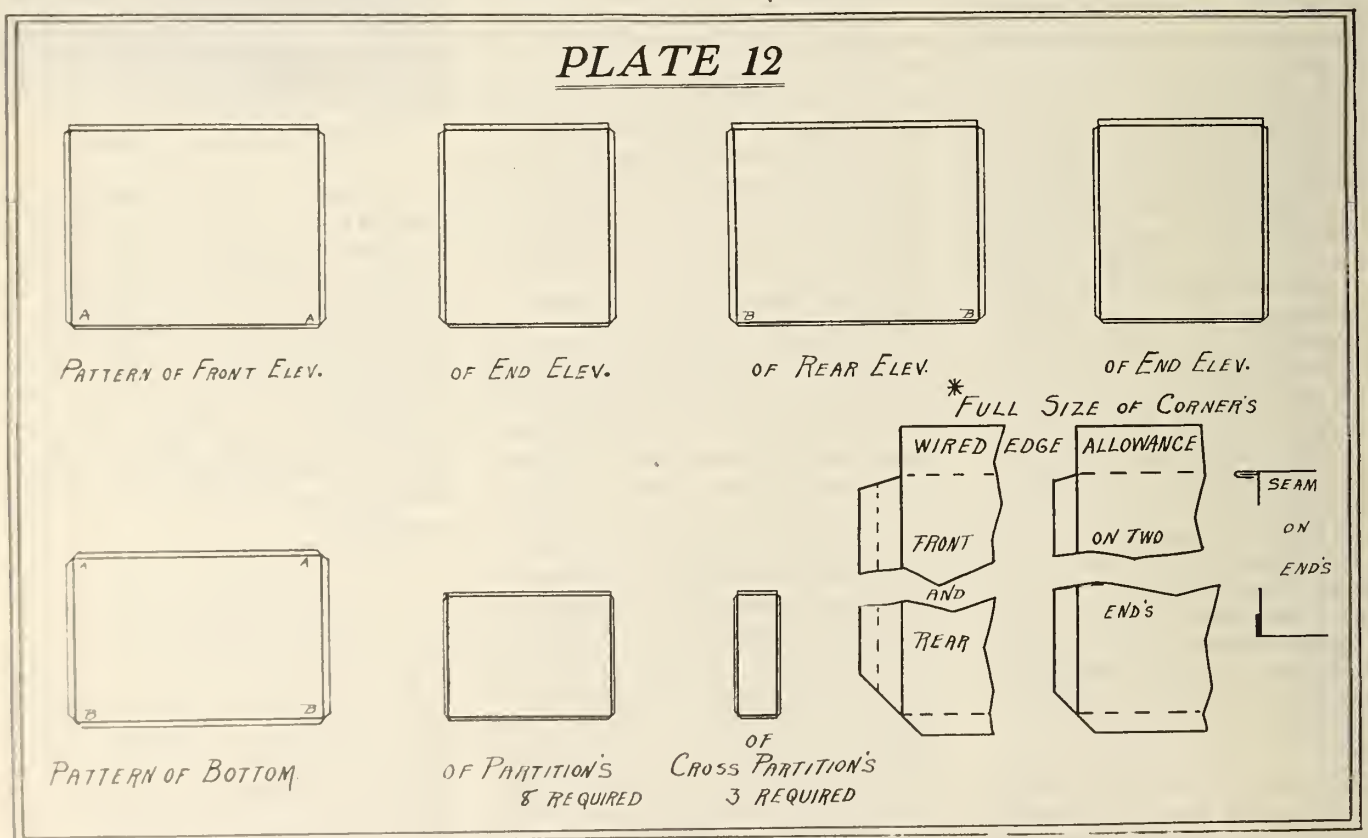
The laying out of the different parts joined as suggested would however depend upon size of material compared to size of article required.

These two articles are submitted with a view of the student receiving practice in making neat seamed joints and wire edges.

Red Devil Tools.

Smith & Hemenway Co., 150 Chambers street, New York, announce that they have a "family album" of about a thousand red devil tools and will be glad to send it to anyone who wants it, free.

PLATE 12



The original drawing of this plate was to scale as described. We would suggest that the student develop the drawing as described, and not as shown in plate.

Practical Problems for Sheet Metal Workers

IN the problems which we show here we have a bullhead or shoe for a stack pipe as in Fig. 1, and in the other, Fig. 2, a fitting which changes the width of the pipe at top to right angles with the bottom, as noted by the perspective drawing.

The article shown in Fig. 1, while not an intricate problem, is a very handy one. As in most all bullheads the round pipe is kept on the same plane as the square pipe, it always requires an elbow to carry the pipe to furnace, thus reducing the slope or elevation of the pipe. In using an article as shown here, the pipe can be kept up closer to the ceiling, and at most will require but an angle elbow between it and the furnace, thus increasing the elevation of the pipe and incidentally the headroom. This is of special advantage where the cellar ceiling is low. The article shown in Fig. 2, while not very often used, will in some instances prove of great value, as it is sometimes required in running up a stack to change the center line or face of pipe at right angles, the upper partition or position of the register in some few instances requiring this.

To develop the patterns of bullhead shown in Fig. 1, it is necessary to have a side elevation of the required article. In drawing this, the angle can be drawn as will be thought best for general use. In Fig. 1, let A B C D be the side elevation and E F G H a front view. As the piece is the same width at top and bottom—viz., E F and G H—the side view as outlined by A B C D is the pattern of the two sides or ends. The next step will be to obtain the patterns of back and front pieces as on lines A C and B D. To obtain pattern on line A C, first divide distance from A to C with a number of equal parts, as shown by A 1 2 3 4 5 C. Draw two lines as K L and M N a distance apart equal to E F or G H—that is the width of the pipe. Square with K L, draw a line, connecting K L and M N, as K M. From K and M mark off on K L and M N the length of line A to C on side view as shown by A 1 2 3 4 5 C, draw a line connecting the two points as shown by L N, completing patterns on line A C.

To obtain pattern on line B D draw two lines as P R and S T a distance apart equal to the width as at E, F or G H. Draw a line at right angles to P R, connecting it to S T. From P and S mark off the distance B-1 on side view and from the point 1 when obtained, mark off the distance 1—D on side view, connect the points thus obtained as at R T, thus completing pattern on line B—D.

The end to which round pipe collar is attached is a square having two of its sides equal to C—D in side view and the other two sides equal to G H in front view as shown by C—D and G—H. Outside these lines are marked the laps required to attach end to body of bullhead. When putting together as shown the laps are cut off on a good angle at the corners, and are then formed as shown at X. When the end is slipped on body, it leaves the corners of body clear of the laps on the bottom. These are then turned in with pein end of the hammer, thus holding bottom on securely.

To obtain patterns of piece shown in Fig. 2 it is first necessary to draw the side view and a front view. In this case let A B C D be the side view and E F G H the front view. As the back of side, as on line A C, is straight, it follows that the front view, E F G H, is outline of pattern required for the back as shown on line A C. To obtain pattern on line B—D draw a line as X—X

(Continued on next page.)

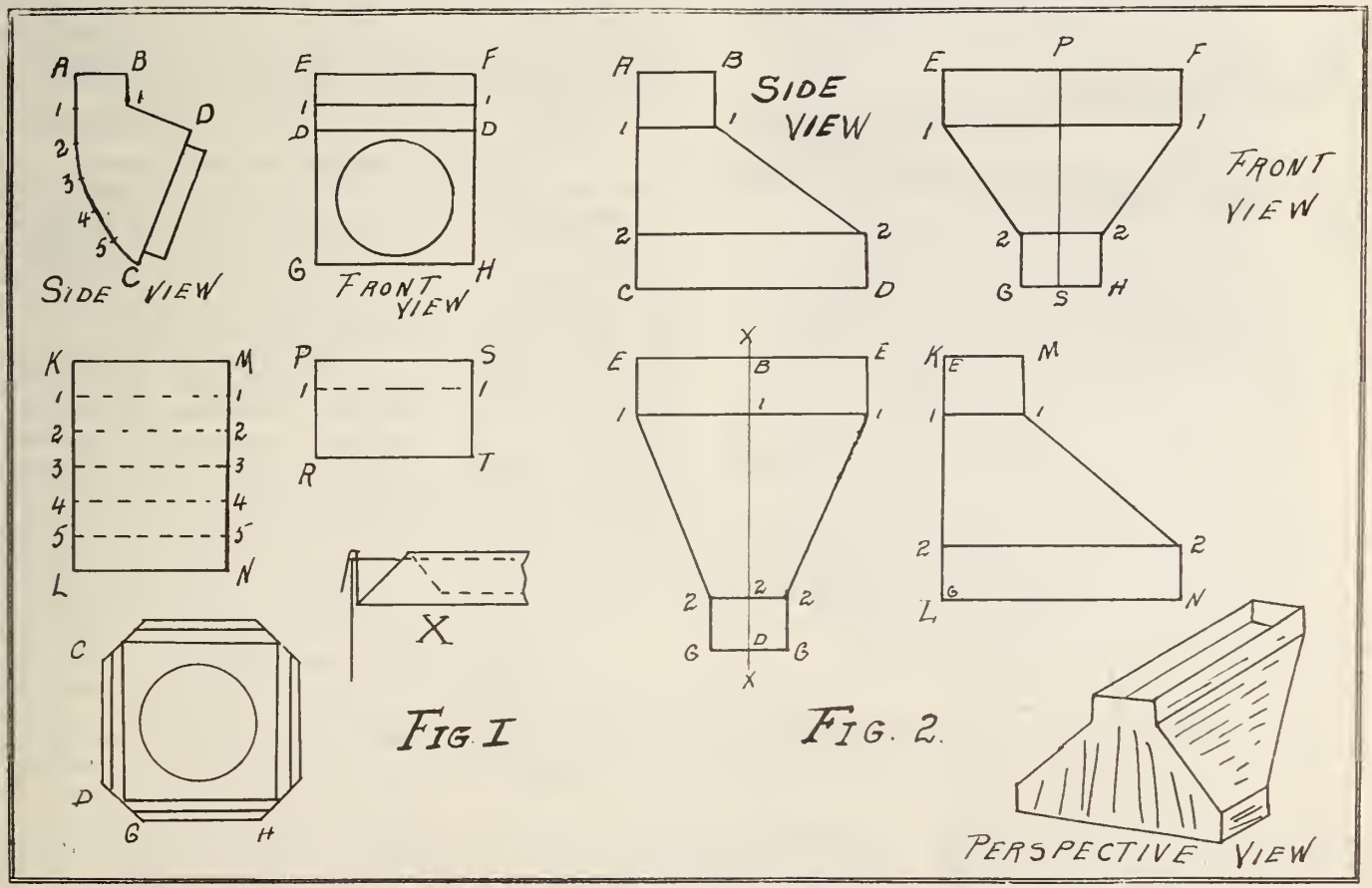


FIG. 1

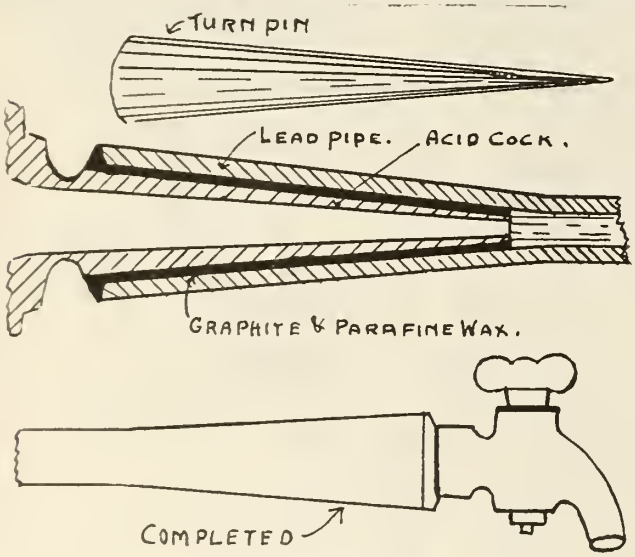
FIG. 2.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

Making Joint Between Acid Cock and Lead Pipe.

Editor Sanitary Engineer:

Some time ago I was called in to fit an earthenware acid cock to lead pipe in connection with a soda-water factory. It was more than I could do and the firm had to send the job to the factory, which meant that the pipe sent back attached to the cock had to be joined. I wiped the joint and it did not last two months. Can you inform me how this connection is made. ACID JOINT.



This is a task which is not often met with except by those who do a general jobbing business. In making a joint between an acid cock and lead pipe it is necessary first to shape a piece of hardwood the same shape as the taper on the cock, or nearly so. Use it as a turn-pin is used until the lead pipe is opened up sufficiently to allow the cock to enter up to the shoulder (see sketch below). Wrap a couple of strands of asbestos twine round the small end of the cock and insert it into the lead pipe, taking care that the lead is long enough to pene over the shoulder of the cock. Next take a quantity of paraffin wax and melt it, adding about 1 part pure powdered graphite to 3 parts wax. Mix thoroughly and while in a plastic form, work it into the shape of a pencil about ⅜ inch thick.

Having inserted the cock into the already prepared pipe, hold a blow torch flame near the lead and warm carefully to such an extent as will just allow the wax and graphite to melt and run in between the cock and lead. When the space is filled up, clean a little of the wax out and carefully pene the lead over the shoulder of the cock, taking care not to strike the cock.—Editor.

* * *

How Can This be Remedied.

Editor The Sanitary Engineer, — I was called in to find out the cause of a soil pipe sweating, and found that on the top floor of the building are situated two batteries of urinals, as well as other sanitary fixtures. The urinals are fitted with automatic flushing cisterns. I concluded that this is the cause of the trouble. Can you inform me of a remedy to overcome the sweating? A. R. S.

The only way to effectively overcome the above trouble is to procure a good pipe covering, and cover all the pipes which are causing trouble.—Editor.

* * *

What's the Cause of This?

Editor The Sanitary Engineer,—Last spring I installed an automatically controlled gas water heater. It was a small one and was attached to a range boiler, with which it was installed in the basement. My customer seemed plased with the installation until just a few weeks ago. It transpired that he had given up using gas for lighting purposes and found that the gas bill seemed too high for hot water only. It was also found that the gas would automatically light up, and close down a great number of times a day. Whether the water was used or not, thus consuming a lot of gas. As I have not had much experience with such apparatus would you mind informing me in your next issue if there is any remedy, and if the remedy will effect a saving in gas?

GAS TROUBLE.

Replying to "Gas Trouble," we are almost sure what the trouble is. The gas is controlled no doubt by means of a thermostatic gas valve, and when the water reaches a certain degree of heat, this valve operates and closes off the gas, all except the pilot light.

The range boiler being situated in the basement, and possibly near a cool wall, cools down many times a day, and as soon as the temperature of the water is lowered a certain number of degrees the thermostatic gas valve opens. This is what is taking place. Now for the remedy. Get a quantity of corrugated asbestos paper and wrap it round the range boiler twice, wire it on, then take some wood slats about ¾ in. square and place them every three or four inches round the boiler vertically. Wire these on and wrap again four times round with asbestos paper and cover over with canvas. Next cover the top and bottom, ordinary boiler covering in plastic form will do, taking care to close the air spaces, which are formed by the slats, both top and bottom.—Editor.

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ANALYSIS OF BY-LAWS.

(Continued from page 26.)

pipe joints to be made with cement grouted yarn steamed into sockets and finished with cement in the proportion of 1 cement to 1 of clean sharp sand. Iron pipes to be pointed with yarn and molten lead. The engineer may apply the smoke or water tests to joints.

Clause (9) is a very commendable one and is far more specific than most plumbing by-law clauses; there is, however, one thing which would improve it and that is, that all horizontal soil or drain pipes from the street line to a height of not less than 5 feet up to the vertical soil pipe stack, be compulsorily water-tested when weather permits, or smoke-tested during winter months. The clause does not demand the smoke or water tests, it says, "The engineer (may) apply smoke or water tests." It will be seen that the tests are optional to the engineer. If he thinks neither test is necessary, he is perfectly free to dispense with the tests, and such should not be the case. The word "yarn" is also used which should be replaced by "oakum."

It is well known throughout the trade that good oakum is by far the best to use when making such joints.

DIMENSIONS OF PIPE.

Clause (10).—The dimensions of each house sewer shall be as prescribed by the engineer, but in the absence of specific directions to the contrary, the house sewers shall be six inches in diameter from hotels, factories, shops, railway stations, office buildings, public buildings, and similar premises, and four inches in diameter from detached residences when there is sufficient inclination and no bend in the line.

Clause (10) would be a little more clear if it defined what is meant by house sewer, as we understand it: the term sewer means, or is intended to mean, the sewer in the street. The term house drain would be more in keeping with this clause.

We would also advocate that no branch less than 6 inches in diameter be connected to any main sewer, the 6-inch drain to be carried to a point next to the private building line, and carried on with cast iron pipe of whatever size be found necessary, according to the number of fixtures to be installed, whether that building be office, factory or public building of any kind. Of course there may be special cases where a special size drain is required.

CAST IRON PIPES.

Clause (11).—Neither salt glazed vitrified earthenware pipes nor porous agricultural pipes shall be used or laid within any building or beneath any cellar, room or basement for carrying sewage, cellar water or roof water but any pipe necessary for such purpose shall be of cast iron with leaded and calked joint.

Clause 11 is up to date and Oakville is to be complimented upon having such a clause. There are several cities in Canada which still allow the old practice of using tile pipes within the walls of buildings, which has been condemned by all experts in sanitary engineering. It is being proven every day that cast iron soil pipe is the best material to use for drain or soil and waste pipes from 2 inches and upward in diameter.

COMBINED DRAINAGE.

Clause (12).—With the permission of the engineer two adjoining buildings may be drained through one 6-inch house sewer, in which case a vertical 6-inch pipe shall be erected at or near the junction of the two branch house sewers, this pipe to be provided with a proper iron cover for inspection purposes.

This clause is better in a way than some which deal with this matter. It will be seen that a vertical inspection pipe is demanded. While we believe it is good practice to use one 6-inch branch for two residences, we believe there should be two cleanout branches as shown in Fig. 1. When a clean or inspection pipe is constructed outside, there is often trouble with chokage which cannot be remedied as easily as if constructed as suggested. Further there should be some mark on the inside wall of the house giving the distance from the branch to the cleanout in each house. No house drain should be installed that can not be cleaned out by rods thus dispensing with the necessity of digging up if it becomes blocked.

OPENINGS TO SEWERS.

Clause (13).—The covers of the junctions left along the common sewer shall be carefully removed, so as not to injure the socket nor to allow any materials to fall into the sewer.

Clause 13 is so simple that it need not be commented upon.

BREAKING INTO SEWERS.

Clause (14).—It shall be unlawful to connect any branch drain with the public sewer by breaking a hole into such public sewer and inserting the connecting pipe, but a proper junction pipe must be inserted and a sufficient length of the public sewer taken up and re-laid to allow of the insertion of the junction pipe.

Clause 14 is a good one. Some of the largest cities in Canada were, until recently, making branch connections into main sewers by simply breaking a hole in the main sewer and cementing a short hubbed piece into it, or in some cases using a saddle piece, and this in spite of the fact that such methods are anything but practical and have often been the cause of a branch becoming blocked.

CURVED PIPES.

Clause (15).—The connection with Y or T junction shall be made with a proper curved pipe and where required a proper reducer shall be used. In special cases, right angled junctions may be permitted by the engineer.

LINE OF DRAIN.

Clause (16).—Curved pipes shall be used in every deflection from a straight line of more than 6 inches in 2 feet, but where possible the house sewer shall be in a straight line from the connection with the common sewer to the building or premises.

(Continued in next issue.)

SANITARY METHODS OF SEWAGE DISPOSAL.

(Continued from page 19.)

everything sanitary, resorted to the use of large quantities of antiseptic fluids, carbolic, etc., which would have the very opposite effect to that intended. The writer has even gone so far as to condemn any kind of soap which contained any such chemical properties, because of the fact that a septic tank is if anything at all an actual cultivating receptacle for certain kinds of bacteria.

The really harmful bacteria or pathogenic germs in sewage are small in number, sometimes absent altogether, and found only where the bowel or other discharges from patients ill from diseases such as typhoid fever or cholera go without disinfection or sterilization into the sewer.

The two classes of useful bacteria were separated by Pasteur as follows:—The anaerobic bacteria which live and grow only in absence of light and air, or derive their oxygen from decaying compounds; and the aerobic bacteria, which on the contrary require plenty of fresh air for their development.

The anaerobic bacteria act upon the organic matters in suspension in sewage by liquefying and gasifying the same; the aerobic bacteria act upon the organic matters in solution and assist the process of oxidation and nitrification.

In the case of sewage from isolated buildings, sewage treatment comprises two successive stages, namely:

(1) The removal of the polluting matters in suspension (by septic or cultivation tanks).

(2) The oxidation and nitrification of organic matters in solution (by bacterial contact beds, or land treatment).

In order to attain success the order of these two processes should never be reversed.

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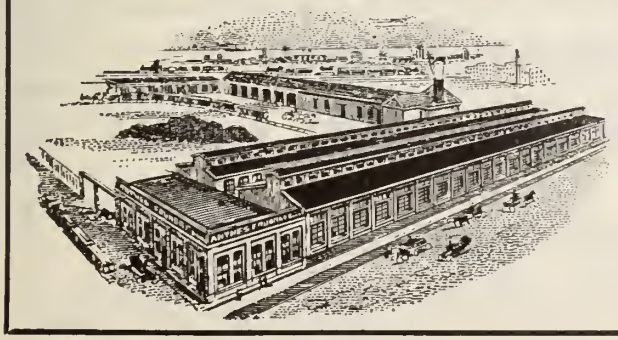

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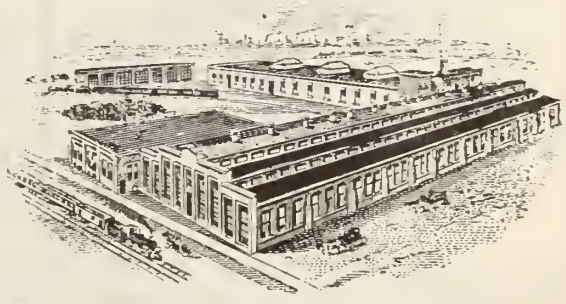

ALPHABETICAL LIST OF ADVERTISERS

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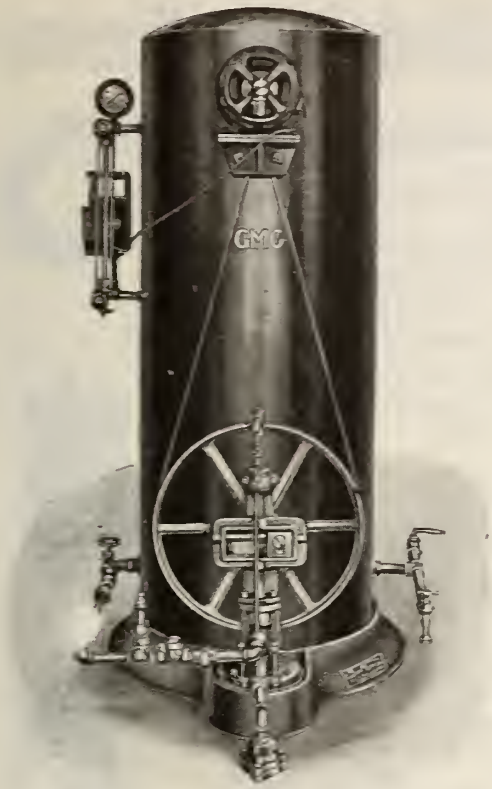

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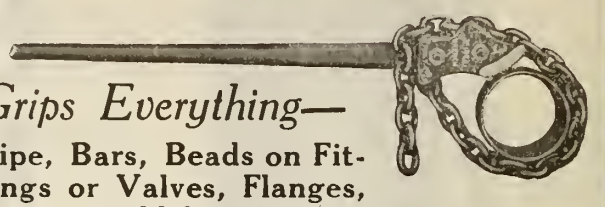

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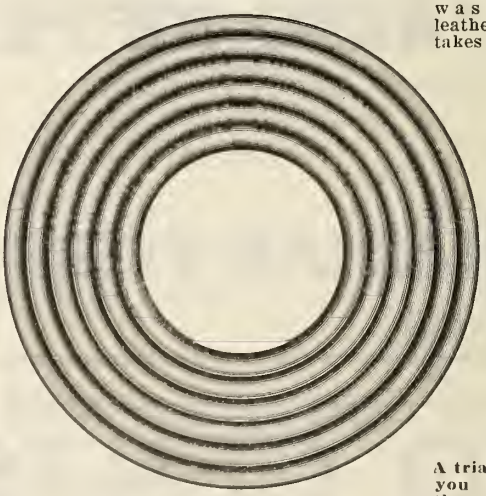

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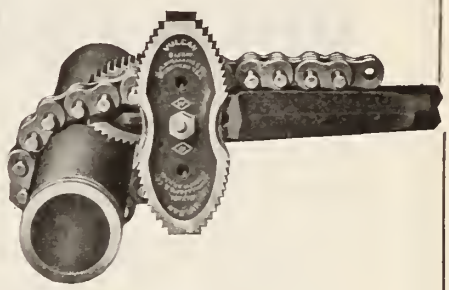

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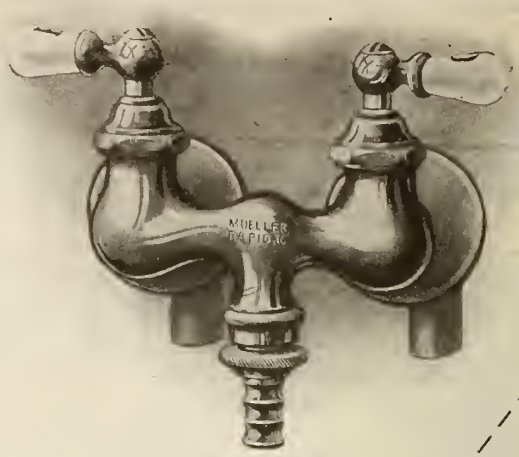

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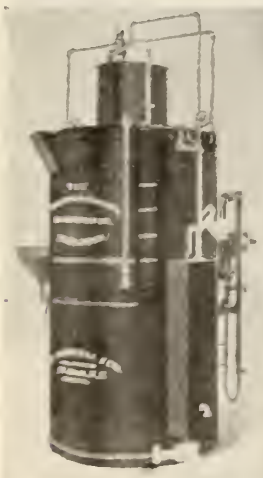

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The latest development of acetylene generators. No storage of gas, Perfectly automatic, Simple in operation. Think of the Residences, Churches, Stores, Hotels, etc., in your vicinity that require better light.

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Send for Circular.

P. Campbell & Company St. John, New Brunswick

MANUFACTURERS

NOTICE

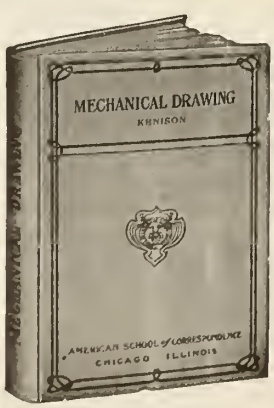
TO STEAMFITTERS

All steam boilers to be used in the Province of Ontario for heat and power purposes must be constructed from a design registered in the Steam Boiler Branch of the Department of Public Works, and must be accompanied by a certificate issued by the Department showing that the boiler has been built to conform with the Steam Boilers Act. Boilers used in a private residence, apartment house, office building, church, hotel or public building, used exclusively for heating purposes, are exempt provided that they are fitted with a safety valve which has been registered, limiting the pressure carried to fifteen pounds, and having an area figured in accordance with Section 107 of the Regulations.

Plans showing the lay-out of all high pressure steam lines, with valves, etc., must be submitted to the Department for approval in the same manner as boiler designs.

For further information address the Steam Boiler Branch, Department of Public Works, Parliament Buildings, Toronto.

Hon. Finlay G. Macdiarmid, Minister of Public Works. D. M. Medcalf, Chief Inspector of Steam Boilers.



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By Ervin Kenison, S.B.

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176 pp., 140 illus. Cloth binding. Gives a course of practical instruction in the art of Mechanical Drawing, based on methods that have stood the test of years of experience. Includes orthographic, isometric and oblique projections, shade lines, intersections and developments, lettering, etc., with abundant exercises and plates.

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Anywhere and Everywhere

TRADE PENBERTHY MARK.

AUTOMATIC CELLAR DRAINER

Working Parts all above Water **Operated by Water Pressure**

A FEW POINTS OF "SUPERIORITY":

WORKING PARTS ABOVE WATER

Not subject to corrosion or slime, and consequent inoperation.

OCCUPIES MINIMUM SPACE.

Because of patented float design with pipe through centre.

CAN'T FLOOD OR OVERFLOW.

Because of specially designed foot valve located in strainer. A "Penberthy" feature.

WORKMANSHIP AND MATERIAL

Only the very best. Valve opens and closes noiselessly and automatically.

WHAT IT DOES "AUTOMATICALLY":

KEEPS THE PLACE

where installed free from water without attention from anyone.

ELEVATES WATER

from 3 to 18 feet, according to pressure.

REMOVES WATER

in quantities varying from 115 to 6,500 gallons per hour, according to size and conditions.

VALVES AND WASHERS

of entire brass; no leather or springs used. Opens and closes quietly.

MANUFACTURED AND GUARANTEED BY

PENBERTHY INJECTOR CO., LIMITED

WINDSOR, ONTARIO

Stocked by all the Leading Plumbing Jobbers in Canada

DART UNIONS

Make joints without bother, whether pipes are in or out of line—and are permanently efficient.

MADE IN CANADA

BRONZE TO BRONZE AT THE JOINT

No deterioration of any kind at the joint, nor is the joint affected by expansion, contraction or vibration.

We will replace **two** for **one** any union bearing our trade-mark, that does not give absolute satisfaction and fulfill our claim.

SOLD BY JOBBERS

Manufactured by

Dart Union Co., Ltd., Toronto, Canada

KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

This plant is at your service. Help us keep it busy.

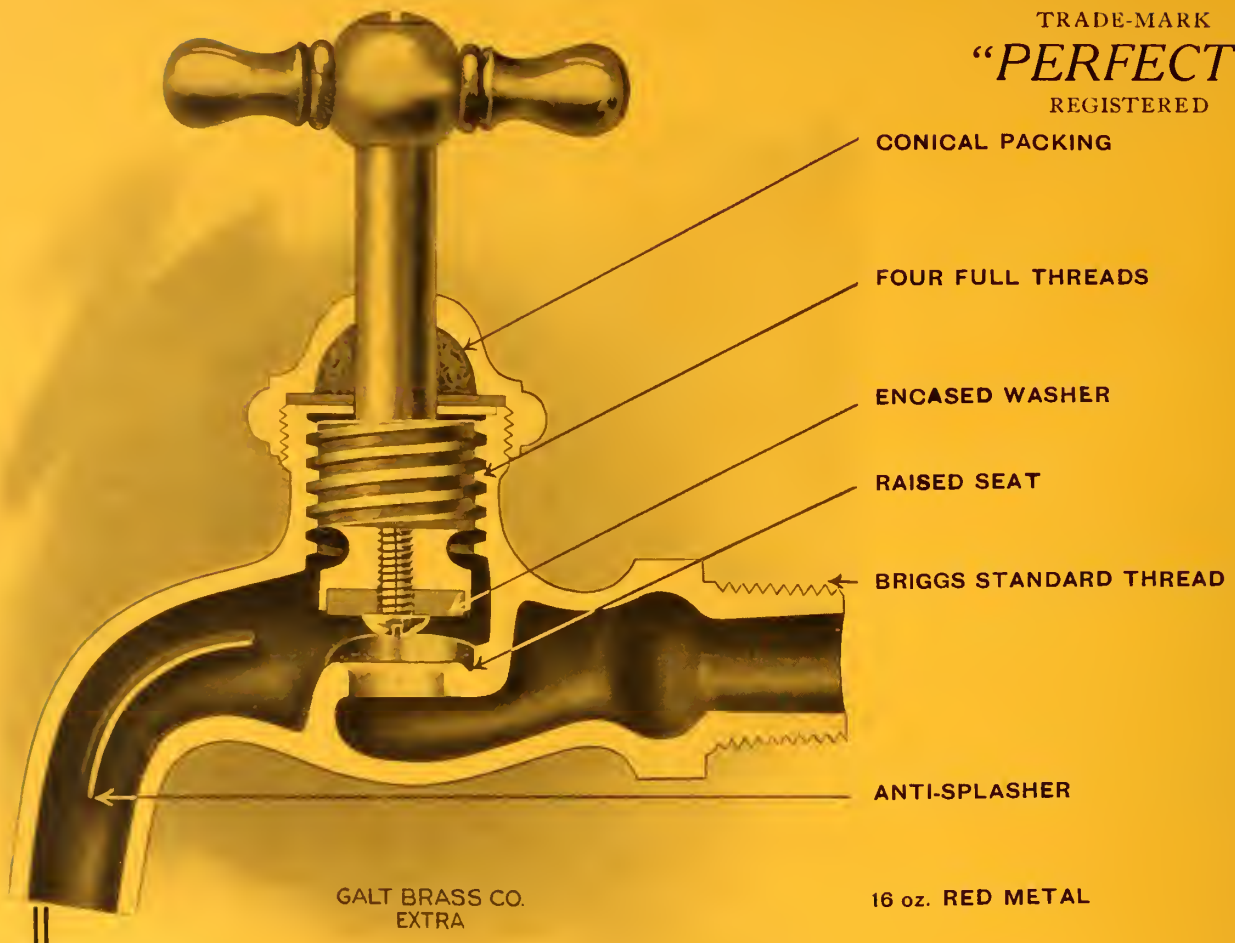
REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

Quickest possible deliveries. **Consistent Prices.** Best quality of goods. **Write for Catalog No. 5.**

The Kerr Engine Company, Limited Walkerville, Ontario

Valves and Hydrants Exclusively

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quick opening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX. Publication Office : TORONTO, MARCH 15, 1915 No. 6

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With or without Washboard

A Cheap, Durable, Sanitary, Enameled Cast-Iron Laundry Tray to take the place of the Brittle, Waterlogged, Unsanitary Cement Tray.

"Hercules" Enamel is the Ideal Enamel for Laundry Fixtures. It is cheaper and more durable for Laundry work than the ordinary porcelain enamels, and its composition makes it possible to successfully cover the corrugations of the Cast-in Washboard, which eliminates the expense and inconvenience of the separate washboard.

Illustrated Circular on Application.

The Standard Ideal Company Limited

General Offices and Factories, Port Hope, Canada

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119 King St. East	42 Beaver Hall Hill	80 Lombard St.	410 Carter Cotton Bldg.

Beaver Brand
Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

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General Offices and Factory: Amherst, Nova Scotia

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When the war began you read our promise to keep our men at work full time at full pay.

We have kept our word.

Just then you promised yourself that so far as it was possible, every dollar you spent would go into Canadian pockets.

Have you kept your word?

If you are buying from actual Canadian manufacturers of water systems you are buying from us—and your confidence is appreciated.

WATER Peerless SYSTEMS

"MADE IN CANADA"

B.O.T. WATER CLOSETS

are the Same in Price, but consider

B.O.T. QUALITY

(Guaranteed 5 years)

Have you received our 1915 catalogue?

If not, write us.

What about a sample order?

The B-O-T Manufacturing Company, Limited

B-O-T Building, 159-161 Richmond Street West, Toronto

Vancouver Agents:
The Robertson-Godson Co.

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Carroll-Wilson Co., Ltd.

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7½% WAR TAX

Has caused no advance in prices of

"JARDINE" and "TOLEDO" PIPE THREADING TOOLS

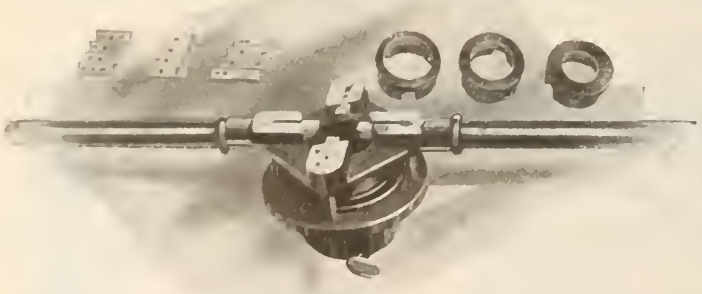
They are made in Canada and pay no duty.

In preparing for the spring trade don't forget to make a list of the tools you will need in the near future.

Right now is a good time to buy, while prices are low.

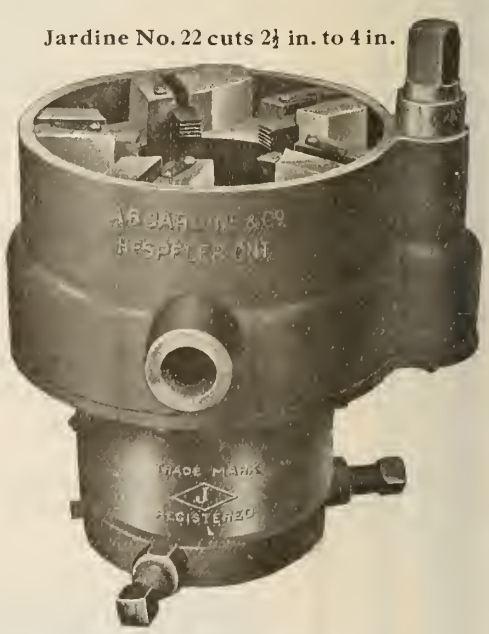
Your Jobber sells them

IT PAYS TO USE THE BEST TOOLS.



Toledo No. 1 cuts 1 in. to 2 in.

Jardine No. 22 cuts 2½ in. to 4 in.



Ask for our new Pipe Die Catalogue.

A. B. JARDINE & CO.

Hespeler, Ontario

Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man.
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THE DAISY BOILER

Over 55,000 DAISY Boilers

are giving the best of service throughout Canada.

The Daisy has qualities which make it a better proposition than any other on the market.

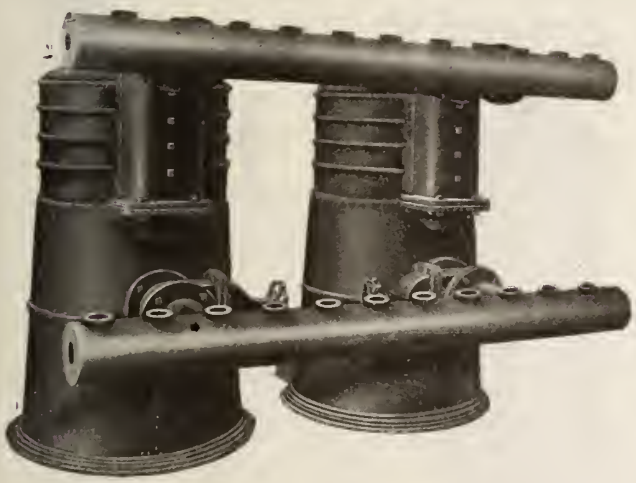
Made in the best equipped plant in Canada.

Without doubt the most popular boiler made.

Every installation means another customer satisfied.

Minimum consumption of fuel.

Maximum amount of heat.



Rear view of two Daisy Boilers connected with twin headers. This system gives great satisfaction in mild and extreme weather.

WARDEN KING LIMITED, MONTREAL

BRANCH, 200 Adelaide St. West, TORONTO

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The MECHANICS' SUPPLY CO., Limited, QUEBEC, P.Q.
The JAMES ROBERTSON CO., Limited, ST. JOHN, N.B.
The WM. STAIRS, SON & MORROW, Limited, HALIFAX, N.S.

Do Your Men

USE or ABUSE

Their Files?

The correct USE of a file is to retain it on a certain class of work until its efficiency is impaired. When it reaches the point where it requires more effort to remove less stock, it should be promptly replaced with a new one.

The ABUSE of a file is its retention *after* it has passed the "impaired efficiency" point. It is no longer able to operate swiftly, accurately nor economically. The expensive time and labor it wastes more than offsets the cost of several new files.

Investigate filing-conditions in your plant. See if your mechanics are *using* their files to *your profit*—or *abusing* them to *your loss*.

Insist that all files be replaced *promptly* —preferably with the

Famous Five:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(Made in Canada)

They have every advantage in their favor: 50 years' experience. 5 modern plants. Highly specialized factory equipment. Every manufacturing step controlled by us.

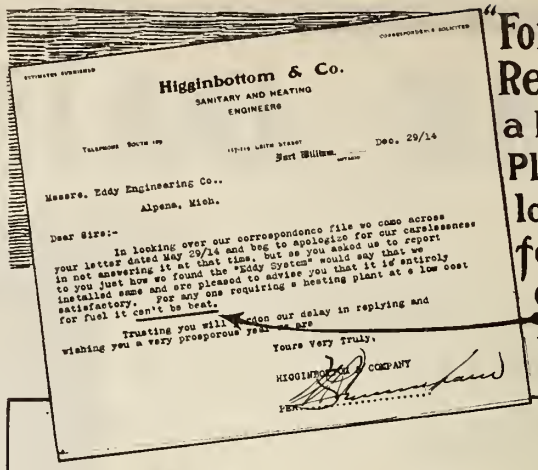
A 60,000,000 yearly output guarantees economical production. Numerous careful inspections and strenuous practical tests insure uniform efficiency in every one of the FAMOUS FIVE.

Try them in YOUR shops. Their SERVICE is their best "salesman"

NICHOLSON FILE COMPANY

PORT HOPE Dealers Everywhere ONTARIO

"File Filosophy"—a handbook on Files —sent free on request.

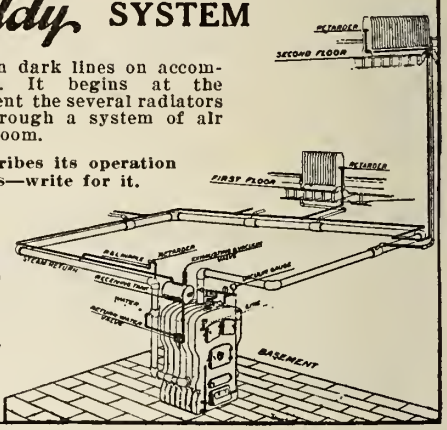

Higginbottom & Co.
SANITARY AND HEATING ENGINEERS
Dec. 29/14
Messrs. Eddy Engineering Co.,
Alpena, Mich.
Dear Sirs:-
In looking over our correspondence file we come across your letter dated May 29/14 and beg to apologize for our carelessness in not answering it at that time, but as you asked us to report to you just how we found the "Eddy System" would say that we installed same and are pleased to advise you that it is entirely satisfactory. For any one requiring a heating plant at a low cost for fuel it can't be beat.
Trusting you will ... upon our delay in replying and wishing you a very prosperous year we are
Yours Very Truly,
HIGGINBOTTOM & COMPANY

"For Anyone Requiring a Heating Plant at a low cost for fuel it CAN'T BE BEAT"

THE *Eddy* SYSTEM

is clearly shown in dark lines on accompanying drawing. It begins at the Retarders which vent the several radiators and terminates through a system of air piping in boiler room.

Our folder K describes its operation and advantages—write for it.



EDDY ENGINEERING COMPANY
ALPENA, MICH. U.S.A.

SOMETHING NEW

THE GEYSER AUTOMATIC WATER HEATER

is composed of a vertical cylinder from four to six feet long, according to size. The cylinder contains brass pipes which receive the steam and transmit heat to the water. These pipes are screwed to the base chamber, but remain independent from one another at the top, consequently, the expansion is entirely free, and leaks are impossible.

FULLY GUARANTEED
MANUFACTURED BY

THE E. S. MANNY CO.,
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Sales Agents

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
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SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

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20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND

THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

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PALACE OF THE KING OF THE BELGIANS
BRUSSELS

WOLVERINE COMPRESSION BIBBS

Red Brass

Polished or Nickel Plated

GUARANTEED

Furnished with Tee Handle as per cut and with Brass or China Index Lever Handle.

Spout has proper angle to throw the water outward into Dish or Pail, no matter how close to wall or sink back the bibb is installed.

Swivel stem insures long life to washer, as it cannot grind on seat.

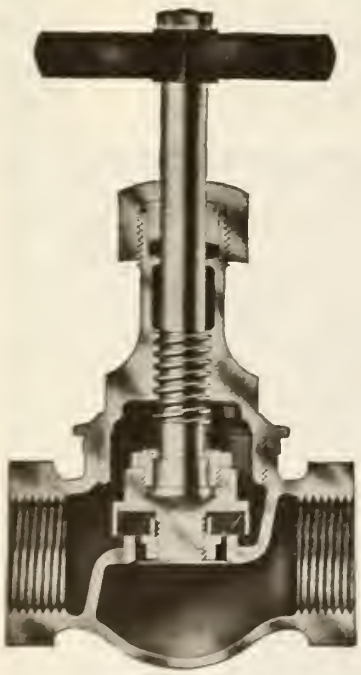
Positively the best bibb on the market for the price.

MADE IN CANADA

BY THE

Canadian Wolverine Company, Limited

CHATHAM, ONT.



Sectional View
Standard Pattern
Brass Globe Valve Screwed
Fig. 106.

JENKINS BROS.' VALVES

"MADE IN CANADA"

A few features of merit found in JENKINS BROS.' STANDARD PATTERN BRASS GLOBE VALVES, as shown in Cut:

—carefully designed.
—well proportioned.
—have full opening.
—good workmanship.
—high-grade metal.
—Jenkins Disc.
—disc removing nut
—metal gland in stuffing-box.
—all parts renewable.
—reasonable price.

Approved for use in Ontario and the Western Provinces by the Departments of Public Works.

CATALOGUE MAILED FREE UPON REQUEST.

STOCKED BY ALL DEALERS.

JENKINS BROS. LIMITED

103 ST. REMI STREET - - - MONTREAL

You have tried the Rest
Now use the Best

VITRO
NO TROUBLE CLOSET TANKS

The tank with no time limit Guarantee

Vitro Guarantee

A new Tank will be given to replace one that at any time proves defective from either material or workmanship.

Manufactured by

Cluff Mfg. Co., Ltd.

81-111 Sterling Road
TORONTO, ONTARIO

Sold by all jobbers.

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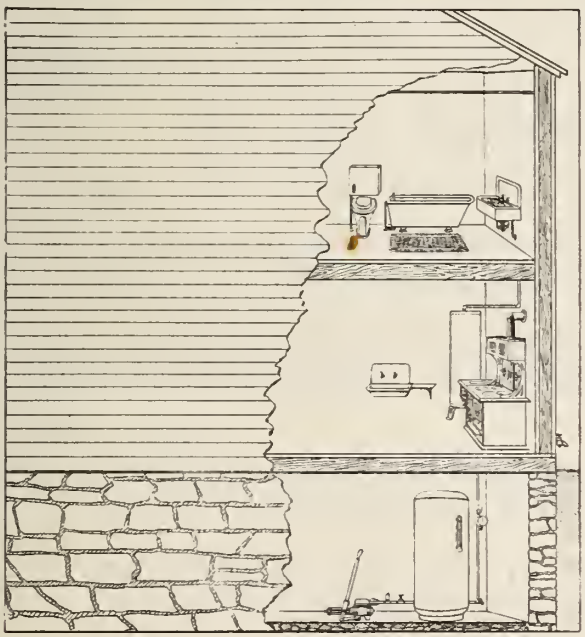

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¶ Should not the connection established during a period of commercial prosperity be maintained, even strengthened, until prosperity returns?

¶ Should not the process of familiarizing and educating go on?

¶ If not, why not?

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are the result of years of training and experience in this one line of manufacturing.

They are made to work right and give complete satisfaction.

DURABLE

ECONOMICAL

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Ask your jobber for CT Brand

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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, MARCH 15, 1915 No. 6

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EDITORIALS

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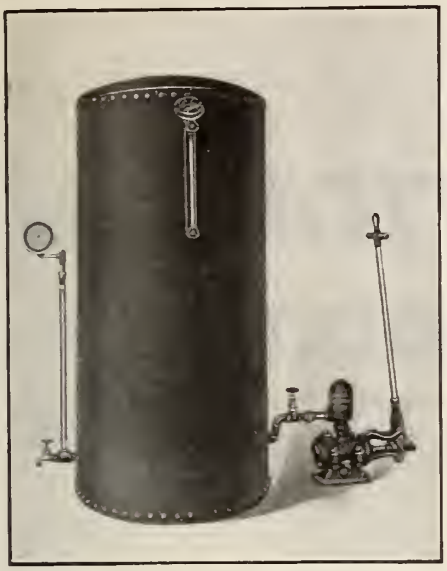

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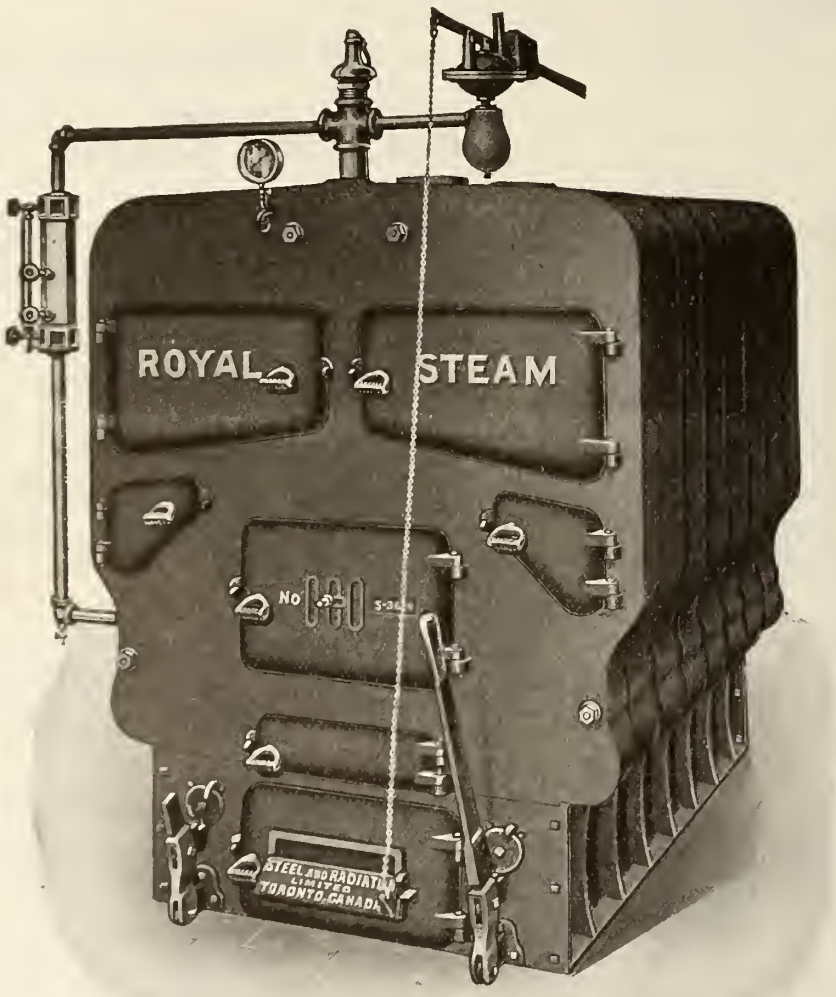

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THE SANITARY ENGINEER

VOL. IX. MARCH 15, 1915. No. 6

Steam Heating Plant in Country House

A Low Pressure Steam Heating Plant in a Country Home, Giving Every Satisfaction Showing That It is Not Necessary to Reside in a City to Enjoy All the Benefits of An Up-to-date Heating System.

SEVERAL of our readers have mentioned that while we have written quite a lot on the subject of the conveniences which residents in rural districts may enjoy, we have not yet described many typical systems.

The illustrations accompanying this article are those of the steam heating plant installed last year in the residence of T. W. Rogers, Esq., Weston. Mr. Rogers is one of the city salesmen of Steel and Radiation. Weston is a little country town, which has recently installed a small sewage disposal plant. This sewage plant was described in The Sanitary Engineer some time ago.

The residence referred to is equipped with every convenience, sanitary as well as heating. The plant illustrated is a Webster modulated system. A piece of 3½-inch pipe is screwed into the top of the boiler and rises to the highest point. A two-inch main is connected up and given a gradual fall of about 1 inch in 10 feet. This main, as will be seen, is run full size until it reaches the boiler, there being just one single loop. It is then reduced to 1¼ inch by using a 2 x 1¼ reducing elbow. All the branches from this 2-inch main are taken off at 45 degrees, and several plugged tees are inserted in case additional radiators are required.

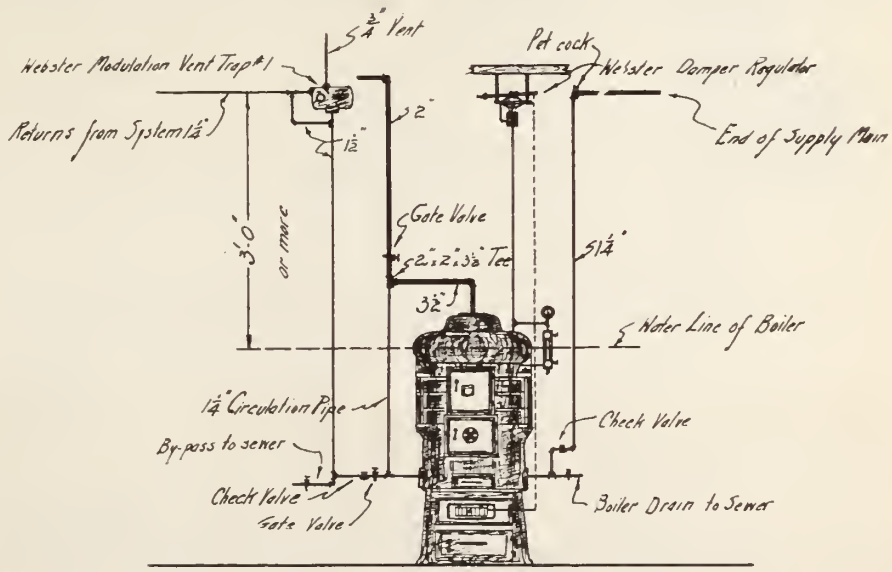
The returns are shown by dotted lines, all of which terminate at a Webster modulated vent trap, as shown in plan of boiler layout.

The boiler and radiation was, of course, supplied by the Steel and Radiation, Ltd.

The system was installed by the firm of John Ritchie Co., King Street West, who enjoy a very enviable reputation in and around Toronto for splendid workmanship. There is an impression amongst some members of the heating trade that specialties in the heating line are only practicable for large buildings. But here we have an 8-roomed house, with a small 4-section, 25-inch grate steam boiler, 292 1-3 feet of radiation, Webster modulated system, automatic damper regulator, all the very latest valves, etc. In conversation with Mr. Rogers, the writer was informed that the house was as comfortable as could be desired.

Residence of F. W. Rogers, Esq., Weston, Ontario.

There is no mystery about such heating systems, and when proper care is exercised they require little or no atten-

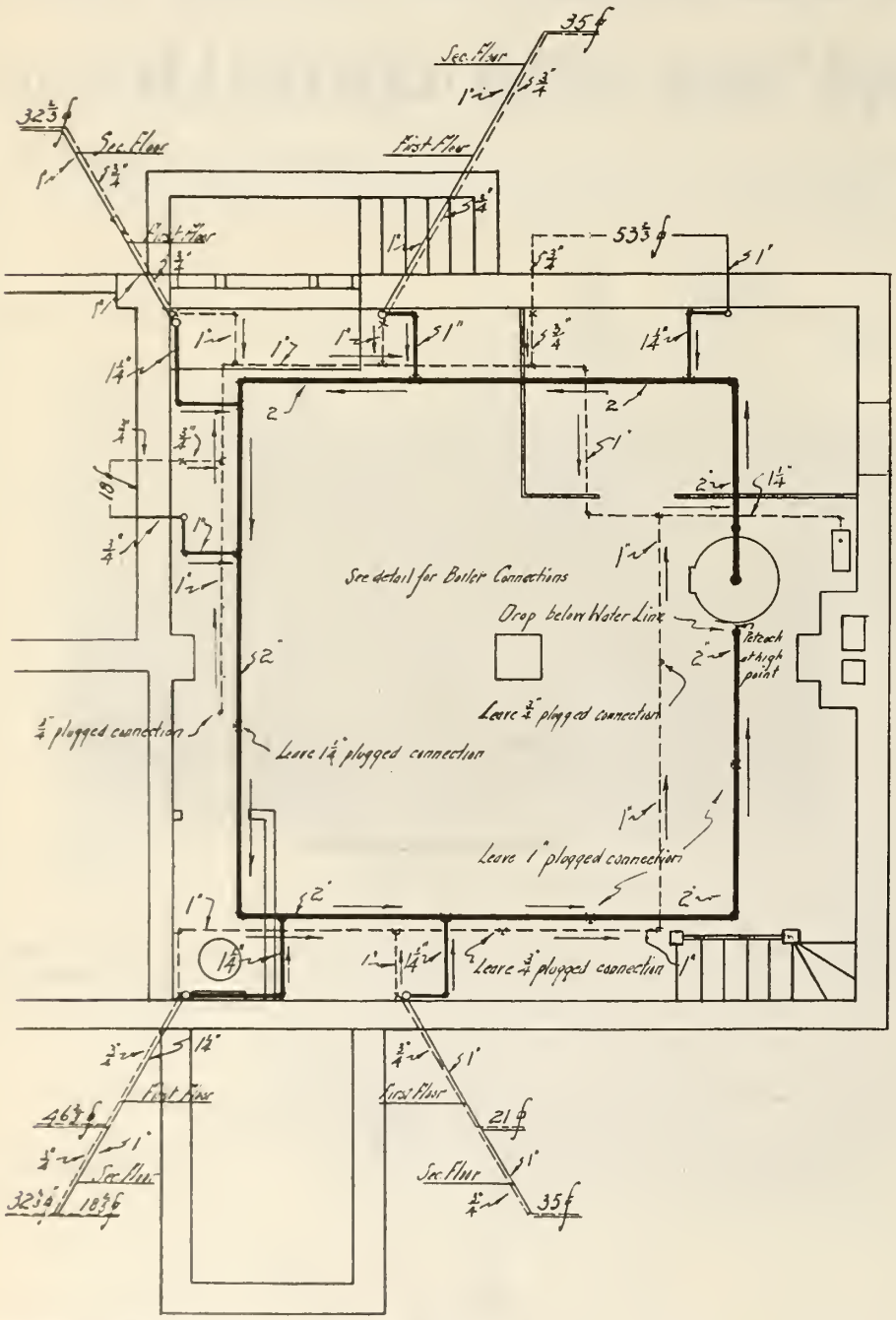


Showing boiler layout of steam heating system intsalled in residence of T. W. Rogers, Esq., Weston, Ontario.

tion. The sanitary arrangements are installed in accordance with the Toronto city by-laws, and include the following fixtures:—

Basement—Double colonial laundry tubs, vitro w.c. combination.

Kitchen—Cast iron enamelled roll-rimmed sink and drain boards and 30-gallon range boiler.



Showing piping plan and radiation. Solid lines are the main steam supply; dotted lines are the returns.

The bathroom is equipped with vitreous china pedestal, high-grade bath and shower combination, vitro w.c. combination.

In the nursery there is fitted up another high-grade vitreous lavatory. All the brass goods throughout are of the finest. Mr. Rogers stated that while he has every city convenience, he has also the free, fresh, invigorating atmosphere of a country home.

We cannot help but look back a few years and think of the time when, if a member of the craft in a city secured a contract to fit up a country home, the rest of his fellow-craftsmen would think that member was taking a great responsibility upon himself in accepting such a contract.

To-day such installations are in no way out of the common, except to illustrate the great progressive strides which have been made in sanitary and heating engineering.

POLLUTION OF BOUNDARY WATERS.

After two years' work, the International Joint Commission, appointed under the treaty of 1909, which has been examining into the pollution of the boundary waters between the United States and Canada, presented a short time ago an interim report.

This report contains the results of the first of the two investigations the Commission is prosecuting. It answers the question:

"To what extent, and by what causes, and in what localities, have the boundary waters between the United States and Canada been polluted so as to be injurious to the public health and unfit for domestic or other use?"

The second investigation, as to the remedying or prevention of the pollution will proceed immediately.

The Commission found three sources of pollution. The first and greatest is the discharge of untreated sewage by municipalities. The second in importance is the discharge of sewage from vessels, which, it is estimated, carried 15,000,000 persons during the navigation season of 1912. The third source is the discharge of water ballast, taken on in polluted harbors.

The report also notes the common practice of filling drinking water tanks in polluted areas, and the transportation across the boundary of persons thus infected.

All this is in contravention of the treaty, which provided that:

"The waters defined therein as boundary waters, and waters flowing across the boundary, shall not be polluted on either side to the injury of health or property on the other."

The Commission consists of six members, three of whom are representative of each of the two countries concerned. They have employed the services of a field staff of thirty trained and expert assistants. The boundary waters examined reach from the St. John River to the Lake of the Woods, a distance of nearly two thousand miles. Upon these waters more than seven million people live.

The most pressing problem of sanitation is this matter of the disposal of sewage. No subject has so engaged the attention of sanitary experts during the past ten years.

The two most essential and elementary processes of any organism are alimentation and waste. In every city these two things stand first, having precedence over all financial, industrial and aesthetic matters—how shall the people be fed, and how shall the sewage be disposed? The health and the lives of the citizens and their children hang on the answers given to these two questions.

"Selling Moses Irons"

An Inside Story of Moses Irons' Employment Policy.

By DANIEL LOUIS HANSON. *Illustration by C. D. MITCHELL*

By courtesy of "System, the Magazine of Business."

BECK strained his eyes toward the river. "Yes, that was Poughkeepsie — there is the bridge." Then, consulting his watch: "You'll have plenty of time to make your steamer connection. We are on time to the dot—New York at eight. But you were to tell me how you succeeded in breaking into the Moses Irons organization. I though that sales force was inaccessible to rank outsiders."

Maxson, a broad-shouldered chap of thirty-five, with that air of well-groomed carelessness which marks the travelled man, turned from the panorama of the window with a smile.

"Why, I got in—that's all. I just made up my mind to do it—and drove ahead. Perhaps, if I had known the difficulties, I might never have made the attempt. But I had burned my bridges behind me, and I simply had to succeed."

"I've been burning bridges behind me all my life. The sky back there is lurid with the light," was Beck's comment. "Yet success has never overtaken me."

"It didn't overtake me, either." Maxson declared. "I had to do some tall sprinting to catch up with it. And then I had a deuce of a wrestle before I won out. As to Moses Irons, I had been planning for five years to make a connection with the concern. In fact, I had made three or four applications at long intervals for a position. Each time I had received a courteous reply—regrets and all that sort of thing, so skilfully phrased that I felt very kindly toward the concern that signed the letters. In the early part of 1911 I had a hunch, however, that the time had come for me to make a move. I had been with the Sanitex people for seven years and had worked up from a stock clerk to their salary limit for a salesman. As their business was a small one, I could see no future advancement. I looked, too, for another period of financial stress. It was due and I wanted to be in a sea-worthy craft during the squall."

"I've never known a time when it wasn't squally," said Beck, in another access of pessimism.

"Well, I took the first good excuse that came along and resigned from the Sanitex," Maxson continued. "I wanted to leave a good impression behind me—not a bad idea for a chap when he has to depend on his past record to get him a new job—and the good will of former employers to give him a boost in the way of a recommendation. Then I started for Chicago."

"I never could strike anything there—always got out of breath trying to keep up with the man I wanted to see," was Beck's thumb-nail opinion of the western metropolis.

"When one gets the pace, it isn't so bad," Maxson insisted. "At eleven the morning of my arrival I walked into the Moses Irons offices and laid my card on the sales manager's desk. 'I am looking for a job, Mr. Renwick,' I said straight from the shoulder.

"'I am glad to see you, Mr. Maxson,' he replied, shaking hands most cordially. 'Tell me how Mr. Lamson is.' Lamson is the president of the Sanitex.

"'He was in splendid health last night. But I am no longer connected with the Sanitex, Mr. Renwick. I resigned a week ago—and with a clean record, I think.'

"'You have something else in view, then?' he asked.

"'Yes, sir; a job with Moses Irons and Company. That is why I quit the Sanitex.'

"He smiled dubiously. 'I am afraid that your action was hasty,' he said.

"'You wouldn't have hired me away from the Sanitex?'

"They gave me a blank to fill out: The first impulse was to write 'yes' after each inquiry," said Maxson.

"'But we have no vacancy, Mr. Maxson. Our organization is pretty well balanced just now. Besides, it is our policy to work men up from the inside.'

"'I don't intend to upset your organization,' I assured him. 'As for using up your own raw material: you haven't enough on hand. You have grown so rapidly that you must look outside or let business get away from you.'"

"Why didn't you tell him that they needed new blood?" Beck queried.

"Because I wanted a job," was Maxson's terse reply. "I don't know what he would have replied to what I did say if the telephone had not rung, leaving me a moment or two in which to plan my next move. When he again was at leisure, I got up, saying: 'I am not going to take up any more of your time now, Mr. Renwick, but I should like to have

the privilege of calling the early part of next week.' This was on Friday."

"You weren't afraid of a hoodoo, were you?" Beck laughed.

"'Oh, sure, drop in when you are passing,' Renwick answered. 'I'm sure you'll strike something in a day or two.'

"'Not unless it is in a letter from you, Mr. Renwick,' I told him. 'I am stopping at the Occident. But I want you to have time to make the usual inquiries about me.' With that I left him. As I closed the door I noticed that he was writing on my card, probably the name of my hotel."

"And you wrote Lamson that very day, I suppose?"

"Yes; but first of all a letter to Mr. Renwick, giving some information about myself, with a lot of references. I was particular about this list; first on it were my past employers, then several big buyers among customers—they count heavily on application—and then two salesmen friends who had worked up into executive positions. I wanted Renwick to feel that I could work in harmony with men who did things. Then I wrote Lamson a jolly letter that would insure his reply to Renwick's inquiry being anything but a knock. I also sent letters to the various ones whose names I had used for references."

"Rather a stiff day's work, that!" said Beck.

"It took till midnight, but I had several days to rest up in. Well, on Monday I had a nice reply from Lamson, in which he assured me that he had sent Renwick a good account of me—from which I knew that Renwick was nibbling. On Tuesday I again visited Renwick."

"'Haven't struck anything yet?' he asked, as I entered.

"'I haven't seen anything from you in my box,' was my answer.

"'I was in earnest when I said we had nothing to offer you, Mr. Maxson.'

"'So am I in earnest, Mr. Renwick. I am not looking for a position. I simply want an opportunity of showing what I can do in the way of selling and also in team work with your organization. Possibly you have some emergency situation—a letting-up in the territory of a man whom you can't reach or who is sick. Assign me to that. If I make good it will be to my advantage. If I fall down you owe me nothing—not even a chance to explain why I failed.'

"By George—but you were gambling!" exclaimed Beck.

"Maybe I was, maybe not. At any rate, it made my man sit up and take notice. We are generally accepted at our own valuation of ourselves at first, at least. Renwick took his head, but I felt sure that he would not forget me. I had done all that I could that day, and so got up to go. 'I should like to outline a plan to you on Thursday,' I said, 'it will take only five minutes of your time.'

"'Come in when you're down this way,' he replied.

"When I called on Thursday at eleven he was busy with a customer. I turned to go, but he followed me out. 'I will be tied up most of the day,' he said, 'so you had better drop in to-morrow, if you still are interested in outlining your plan. If you are not engaged now for a few minutes, perhaps you would like to meet Mr. Irons. I imagine you and he have many friends in common.'"

"But you had spoken about a plan the day before?" suggested Beck.

"So I had, though at the time I had none in my mind. But I needed an excuse for calling again; besides, I wanted Renwick to keep me in mind. On Thursday, however, the plan that had come to me had been outlined on a sheet of paper to give it dignity. I was ready for Mr. Renwick, but of course I was delighted to make the acquaintance of Mr. Irons under such auspices. I found him a prince of good fellows, with a handshake that warmed you right up to him. Apparently I was the only one in the world to him at the moment—and he was sincere in it, too. We chatted about this man and that. It was the most rambling of conversations, but after awhile I had more than a suspicion that he was taking my measurements—was looking at me through the view-point I took of others. Clever method, was it not?"

"I always have heard the he is a smooth article," said Beck.

"Smooth is not a strong enough word, Beck. Business sagacity, sugar-coated, is Mr. Irons' big quality. I imagine that the under side of his desk is set with a complete battery of push buttons on which he can work out code messages to his staff. For just about the time I thought best to get away, the door opened to Mr. Dolliver, the waterworks manager, who had a little matter to bring up. Mr. Irons held me till he had finished. It ended with my introduction to Dolliver and a three-cornered chat about waterworks superintendents and plants throughout Ohio and Pennsylvania. When Dolliver was called away he collided in the door with the plumbing manager, Jesperson, on his way in. So I met him and had another chat. To make the story short: in the course of half an hour I met six of Moses Irons' executive staff—"

"He was having them size you up?"

"So I thought at first; but later I changed my opinion. That they were signaled for, is certain. But as far as they knew it was simply to pick up some item of information or suggestive hint that might come from one personally acquainted with the territory. That I was an applicant for a job was not, I think, known to them at the time. Yet Mr. Irons probably did not overlook the advantage of getting from them later the impressions they had received of me. It all ended by Mr. Irons insisting that I take lunch with him at a little restaurant in Fifth Avenue up near Randolph, where on a red-checked tablecloth we had a meal that proved to be a feast."

"I have been there," said Beck, brightening at the memory. "They have a dish of dill pickles on the table all the time; but—" and again he grew respondent—"the proprietor died last week."

"Yes," laughed Maxson, "but he left the pickles, so cheer up again, old man. All this time I had not said a work about wanting a job. I knew the rules of the game, and that Renwick was dealer."

"But the next day—"

"The following day, however, I felt the time had come to make a play."

"Friday again?"

"Yes; on Friday morning I sat down beside Mr. Renwick's desk and unfolded my sheet of hotel paper. I knew it by heart, of course, but wanted to show I attached considerable importance to it. It was an outline of a trip from Chicago to the Pacific coast and return; going by way of Omaha, Denver, Salt Lake City and the Puget Sound cities, then along the coast to Los Angeles and San Diego, and back by the southern route to San Antonio and Kansas City. I was to handle only one line on the trip—vitreous lavatories—carrying three sample trunks of fixtures; and reaching out not only for the master plumber, but for the architect. I hadn't quite finished when Renwick sat back with a little laugh.

"'I thought you were looking for an emergency job as a test! How long do you suppose this trip of yours will take?'

"'It couldn't be done in less than six months,' I ventured cautiously.

"'Six months! Why, man, it would take three years. We might as well sign a life contract with you at the very start.'"

"And the deal fell through—that is, the trip?"

"No, sir, it went through. Within a week I left for the west with my three sample trunks."

"But that was only a year ago," Beck objected.

"As I say, I started for the west and worked my way slowly but thoroughly as far as Portland, where I got a brief summons home. That was only ten months after I had started out, and I felt worried. I had worked mighty hard;

and I had secured results, too. Not only had I taken orders from master plumbers but also from architects had come specifications for some of the largest buildings then projected. More than that, I had been extremely punctilious in my correspondence with the house. In short, I had put my best foot forward—and yet the message that gave no reason made me feel uneasy. 'Come home at once with samples,' was all it had said. When I did reach Chicago, however, these was nothing uncertain about my greeting, from Moses Irons down. It was cordial—so cordial that I felt, for the first time, that I was part of the Irons organization."

"Just let me ask one question before you get away from it—how was the concern in its correspondence with you? In other words, how does it handle salesmen?"

"As if we were intelligent human beings, and not a part of a machine. No radical sales or advertising policy is decided upon without first being submitted to the salesmen for their opinion. The letters received from the home office are neither silly eulogies nor undeserved roasts. It was always a pleasure to see an envelope with the Mosts Irons return card among the mail. We were working under the sales manager, and every sprig of an office boy did not have the right to send us letters, venting his spleen or showing his ignorance."

"I want to get a job with that house," said Beck with emphasis. A station flew by the window. "New Rochelle—twenty minutes from Broadway," he announced. "But go on; you were received with open arms; the fatted calf was slaughtered."

"Hardly," Maxson smiled, "but you know the rest. Moses Irons had decided to branch out into exporting and as a first step, to establish a London office. I had been selected as the manager; I am on my way there now."

"And that is the story of how you got next to Moses Irons. You came, you saw, you conquered. Oh, you commercial Caesar!"

"It was all that I knew at the time; now I am wiser. Among my effects I have a lot of instructions governing the hiring of employees from office boys up to salesmen. And, Beck, the beauty of it is that it is a science without any happy-go-luckyism about it. A man's pedigree counts for little; but his habits for much. It isn't necessary to have ancestors who came over in the Mayflower or even with Lief Erickson, but your personality must match up with certain requirements. They even take you at your own valuation. They gave me a blank to fill out: Was I truthful? Was I sober? Was I careful? Was I this and that? The first impulse was to write 'yes' after each inquiry; but in the other column I read: Are you untruthful? Are you careless? and so on. And, do you know, I began to see faults in myself that I would have knocked any man down for imputing to me. More yet—what I didn't know then—I was under observation all the time that I was answering those questions; and my manner counted either for me or against me—I don't know which."

"Say, old man," broke in Beck, "if I ride down to the dock with you, will you have time to apply your Bertillon system to my humble personality, and tell me where I exceed the requirements so I can train down to the right average?"

"Don't get funny, Frank. You'll land yet if you only make the best of yourself. Right there is where Moses Irons' system of fitting the man to the job, and the job to the man, wins out. It provides specifications up to which a man can grade himself with a little effort. It gives him a fighting chance—"

"Grand Central—Grand Central station!" called the porter, looking into the smoking room.

Beck's face was serious as they walked down the train shed up into the concourse.

"You reason, then," he asked, "that you didn't get the job through any good luck, but because you filled the specifications by your appearance, training, and by the qualities you displayed in going after it? I guess you're right, old man; the modern busines man has to reduce the element of chance to the minimum. He can't afford to gamble too much—and he doesn't have to. The systematic handling of a business eliminates the necessity, practically. But it is pretty hard on us fellows who make our entry into business before these things were thought of—us 'have-beens.'"

"Beck," said Maxson as they shook hands at the curb, "it is the best thing yet. It does away with the misfit—that saddest of human spectacles. It reduces favoritism to an absurdity. It eliminates the waste—that awful burden that the old haphazard method put upon industry.

"As for 'has-beens,' they will disappear, too, because this enables them to be reabsorbed into the economic machinery and come out again as marketble vlues. It is no longer fickle luck that rules, but a man's merit and fitness—each man finds his work. And it means the first realizing glimpse of that long dream of the ages—the standardization of men."

A PLUMBING INSPECTOR FOR CHATHAM, ONT.

All reasonable legislation that has for its object the improvement of the conditions of life among the people is deserving of support. The object uppermost in the minds of the men who compose our governing bodies should be that of making life more pleasant, healthful and profitable for the great mass of people whose representatives they are. A great many public men become possessed of the idea that their sole aim and purpose should be to practise economy and keep expenses down. The public body, however, that can show the largest bank account at the end of the year is not always the one with the best record to its credit. When economy conflicts with the needs of the people, then it is a duty to consider the spending of money to a reasonable limit. We would not for a moment wish to be considered as advocating prodigality in the distributing of public funds, for there is reason in everything, but we do think that healthful and pleasant surroundings should be considered ahead of the massing of large surpluses of money.

In the light of this fact, then, it is a pleasure for us to note the action of the Chatham board of health in once more bringing up the advisability of the appointment of a plumbing inspector for the city. The question has been up so often that it has become, largely, an old story with the ratepayers, and yet we find ourselves no better off to-day than we were when the idea was first introduced.

It is hardly necessary to point to the excellent work that a plumbing inspector could accomplish in this city. The benefit that such an inspection would have upon the health of the community is also a well-known thing among those who have given the subject any consideration whatever. The citizens need not be told that some of the plumbing installed in Chatham is nothing short of being atrocious. There is no doubt that the plumbing of the city should be subjected to a rigid inspection.

If the board of health—the men who are in closest touch with the situation—had the power to appoint a plumbing inspector, there is no doubt that one would be appointed. This then places even a greater responsibility on the shoulders of the aldermen, and they should consider the question seriously and studiously before they decide to allow the present year to go by with a plumbing inspector still a dream of the future.

The Standard Valves Co., Ltd., capitalized at $50,000; head office, Ottawa, to manufacture and deal in all kinds of heating and cooling apparatus.

Sanitary Methods of Sewage Disposal

This Series Will Deal With the Sanitary Methods of Sewage Disposal in Rural Districts, Where There Are No Drainage Systems—Even Large Cities Are Realizing That Sewers and Drainage Systems Are Not By Any Means Disposal Systems.

WE have already shown various kinds of tanks which are giving every satisfaction and in future articles will show more. In this issue we show another form. Fig. 1 is that of a tank which operates with what is known as the Rhoads-Williams type of syphon. This septic tank, which, while

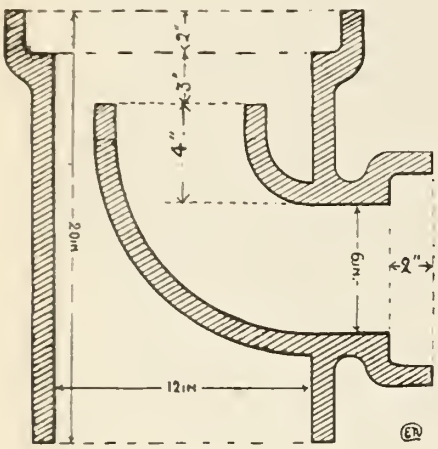


Fig. 4.

the principle is the same, differs from the tanks previously described in two of its details.

The septic tank proper is in itself divided by a partition wall, the sewage entering the chamber, A, passing into the chamber, B, and thence overflowing into the discharging chamber. Trouble is sometimes found with the single settling chamber, in that the entrance of sewage stirred the contents to such an extent that much solid matter found its way into the discharging chamber. This trouble has been obviated by using a settling chamber divided into two separate compartments, thus enabling the overflow to deliver to the discharging tank liquid only, thereby preventing the solid substances from clogging the syphoning apparatus.

The other difference being in the syphon, which is of the Rhoads-Williams type, as shown in detail in Fig. 3. The action of this syphon depends upon the sudden releasing of compressed air confined in the long leg of the trap between the water in the discharging tank, and the water in the deep seal trap. As the contents of the tank rise, the pressure increases, finally becoming strong enough to force the water out of the blow-off trap. This releases the air pressure, and a heavy flow from the tank into the syphon at once takes place, which quickly starts the syphon into full operation. The action of the syphon is stopped by the admission of air through the air pipe, air entering the pipe from the outlet pipe as soon as the flush of waste from the tank decreases sufficiently to expose the lower end of the air pipe. The opening from the tank to the syphon is enlarged in order to insure the quick filling of the apparatus.

The question of grades which is necessary to effect efficient distribution of fluid is one which requires a little attention. If the ground is fairly level and of a good quality for the purpose, the tile pipes should be laid so that no more than one inch in ten feet is given. By adopting this method it will be seen that even if a main distributing pipe is 40 feet long and the diameter be 4 inches there will be sewage in the full length of the pipe, the branches must also be given no greater fall than one inch in ten feet.

It may be, however, that the grade of the ground is greater, and to only allow the fall mentioned, the pipes would require to be deeper, which is proper at the tank. In such a case it is necessary

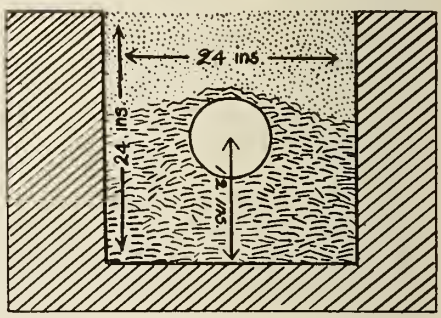


Fig. 5.

to provide special means. Fig. 3 shows how the trouble may be overcome. In fact by laying piping as shown, it is possible to use a hillside for the purpose of a sewage disposal bed.

Unless this is done there will be trouble with sewage oozing up through the ground at the lower reaches of the pipes. Fig. 4 shows a large view of the special fitting which can be procured from almost any tile pipe manufacturers at a very reasonable cost. Another point to

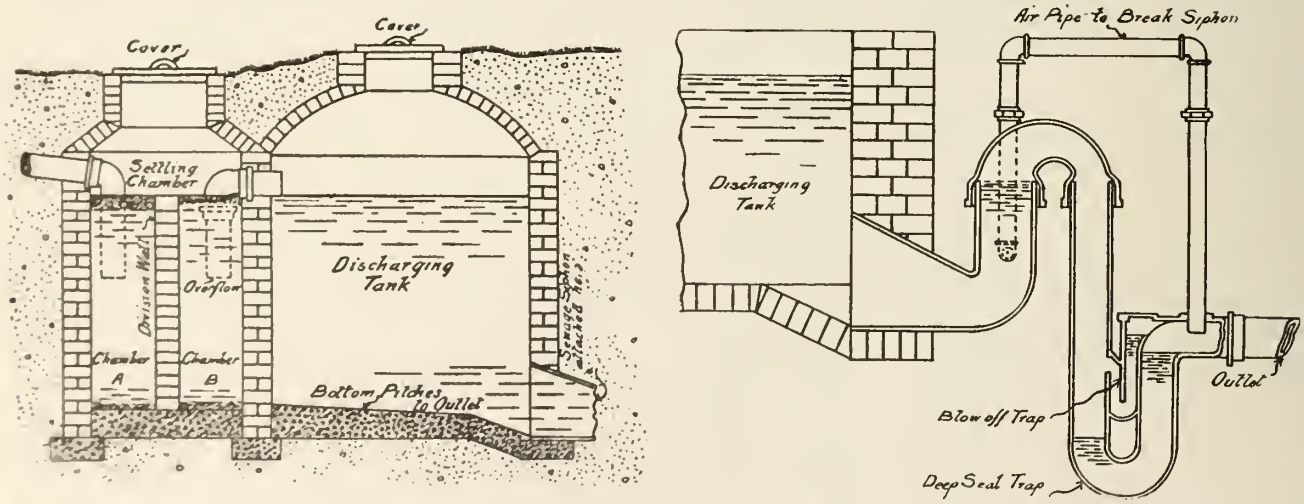


Fig. 1 shows a tank only, with the valve broken off at the outlet. Fig. 2 shows an enlarged view of the syphon as described.

be considered and one which has not been given the importance it deserves is that of providing proper means to prevent the earth from washing into the open joints of the field tile. This trouble may be overcome in two or three ways. One is to cut up a larger size of ordinary drain tile and place a piece or pieces over the joints in the form of a saddle. the other is to dig a portion of the trench at each joint of the pipe, remove about a shovel full of the earth and fill under the joint and above with several inches of coke. Where the earth is inclined to be of a clayey nature the pipe should be embedded in clay as shown in Fig. 5.

(Continued in next issue.)

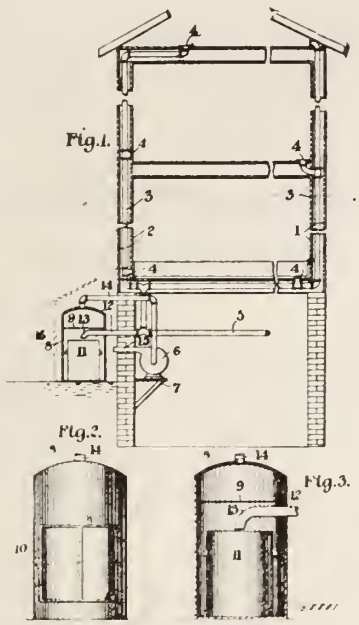
NEW CANADIAN PATENTS.

No. 158,801.

Hugh Cooper, and Elizabeth Soper, assignee of a third interest, both of Hamilton, Ontario, Canada. 10th November, 1914; 6 years. Filed 20th May, 1913. Receipt No. 224,654.

Claim.—1. In a suction cleaning device, the combination with a casing placed exteriorly of the building or house and having pipes extending therefrom up into the walls of the house, and communicating with the different portions thereof, a discharge pipe located at the bottom of the pipe system and extending into the casing and provided with a downwardly turned end, a dust receptacle located in the casing beneath the downwardly turned end, a screen located above the discharge pipe, a pipe leading from the top of the casing, a suitable fan disposed at the one end of the pipe and located in the building, and a foul air discharge from such fan extending through the wall of the building to the exterior thereof, as specified.

2. A suction cleaning system comprising a casing placed exteriorly of the house pipes having suitable vents normally plugged extending up in the walls



Suction Cleaning System.

of the house, a discharge pipe connected to the aforesaid pipes and extending out into the casing, a suction tank, a pipe connected at one end to the top of the casing and having the other end connected to the intake of the suction fan, a foul air outlet pipe from the suction fan extending outside the building, a screen of suitable material inserted horizontally within the aforesaid casing intermediately of the height of the same, and a dust and dirt receptacle situated below the aforesaid screen, the aforesaid discharge pipe having a downwardly turned end for discharging the dust and dirt into the receptacle, as specified.

3. In a suction cleaning system, an airtight casing having suitable doors, pipes extending up through the building having suitable vents for the insertion of the hose, said vents being normally plugged, a discharge pipe connecting the aforesaid pipues with the casing, a suction fan, a pipe connected at one end to the top of the casing and having its other end connected to the intake of the suction fan, a screen situated horizontally in the aforesaid casing intermediately of the height of the same, said discharge pipe having a downwardly turned end and situated below the aforesaid screen, and a removable dust and dirt receptacle below the discharge pipe and a foul air outlet pipe from the suction fan for discharging the foul air exteriority of the building, as specified.

CHANGE OF ADDRESS.

The Schaeffer & Budenberg Mfg. Co., manufacturers of thermometers, pressure gauges, indicators and pyrometers, etc., have moved to their new fireproof building, which is situated corner of Berry and South Fifth Streets, Brooklyn, New York.

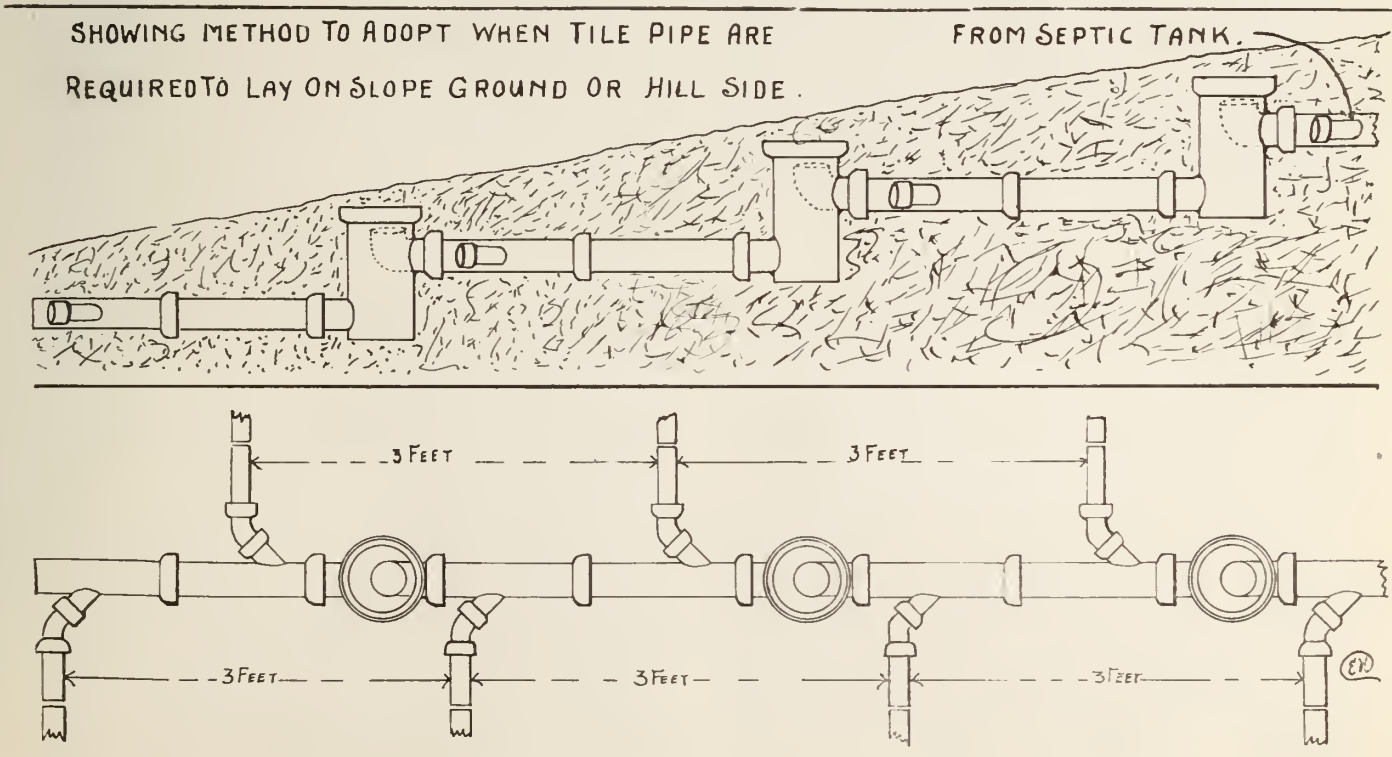


Fig. 3.

The Sanitary Engineer

Plumber and Steamfitter of Canada

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TORONTO, MARCH 15, 1915

Our Spring Number

LAST year we published the first annual spring number of The Sanitary Engineer. It was the biggest, and at that time, the best issue ever published. We have, however, a greater treat in store this year for our readers.

The April 1st issue will be our 2nd Annual Spring Number. It will surpass anything of its kind ever published in Canada. The advertisers will be more numerous and will represent only those manufacturers who produce the very highest grade of goods required by the trade, and who are ready to serve their customers on the "Satisfaction or money back" guarantee. High-grade goods like first-class workmen can always demand their worth, and in buying from those advertisers who, from time to time, use pages of The Sanitary Engineer, readers can rest assured they are getting 100 cents on the dollar of value. This Spring Number will also be the best ever published from an editorial viewpoint. It will contain the first of a series of articles entitled: "How goods are made." These articles should be read by every person interested in the trade. They will be highly illustrated by both line cut drawings and half-tone engravings. No expense is being spared in the preparation of these articles, and they will be not only works of art, but also of great educational value to each and every one of our readers.

What's a Convention?

TO some persons who attend the various conventions, the latter are nothing more or less than so many opportunities in which to have a "good time," though we question what the term "good time" means. Does it mean a time for hand-shakes, entertainments, dinners, etc.? We think not. If we were to be asked for our definition of a "good time" at a convention we would reply as follows:

Strict attention to business, earnest thought and an exchange of opinions in as open a manner as possible. A person in attendance at a convention should be ready to give off as much dynamic energy as possible, and should also be ready to absorb every unit of power given off by each of his fellow members. Nothing in the world will give a person sweet, restful sleep as will a hard task well done and done cheerfully. A convention is almost like a court. The various committees of the association holding a convention are presenting their year's work before their fellow-members; a plan is put forth for the coming year; committees are appointed to carry out those plans, etc. Let us hope that there will be a large attendance at the coming Ontario convention. The committees will have some splendid work to report and it would be very discouraging to them to see a poor attendance.

The License Question

NO question is so vital to the trade as that of the licensing question. In many towns the licenses are issued to Tom, Dick and Harry. No qualifications are necessary, other than payment of the fee which may range anywhere from one to twenty-five dollars.

However, these towns and cities are one by one seeing the folly of their ways; the strenuous work of various members of the craft is beginning to bear fruit.

For upward of two years The Sanitary Engineer has been fighting this battle, not only for the trade, but for the public, and to-day we find that the City of Toronto has amended its by-laws governing the licensing of plumbers. To-day any person desiring to work at the trade as either employer or journeyman, must first show that he is a competent workman. He must pass a board of examiners if he has not held a license prior to the amendment, and further, if he already holds a license and the report of the chief plumbing inspector goes to show that he is not a fit person to retain that license, or rather have it renewed, it will be cancelled. It is not a matter of fee, nor should it be, but it is a matter of character and practical qualifications.

In the near future we hope to see every board of health demand that a bond of not less than $1,000 be furnished by every employer, with a view of protecting the public from men who, while they are practical, are tempted to use inferior material or fake up a job which will just about hold tight until the inspector gets off the job. The whole trouble with the craft to-day is the cry of "meet the price." Speculative builders get all kinds of figures, or claim they do and then the trade scramble after the job as if there was a fortune in it, instead of setting a standard for both workmanship and material, and then seeing to it that the price pays for the job and leaves a fair margin of profit. If every sanitary and

heating engineer were called upon to furnish a bond subject to forfeiture, in case of either workmanship or material or both being proved to be of an inferior character, the day would soon begin to wane for the "botch" or crafty plumber. Just as soon as these things come to pass, the sanitary and heating engineer who is trying his level best to do the right thing, will receive his just due.

Signs of Improvement

THAT business conditions in so far as the country as a whole is concerned are gradually improving is the contention of The Financial Post. Dealing with trade figures of Canada it states in its last issue that the country is paying its debts. The exports in January, it points out, were approximately equal to the imports.

This is exceptional for January. In the case of manufactures, the situation was assisted materially by war orders. The same is true of animal products. It is likely that the effects of these special orders will be more apparent during the next month—that is February—the returns for which are not yet available. We cannot take the filling of these special orders as an indication of improvement in the normal trade. There are, however, other signs. The bare lumber yards, bare shelves, and, we might add, bare backs, will very soon create a demand. We have some evidence of this in a statement by a responsible official of a large mail order house to the effect that their business had shown very decided advances in February. Orders were coming from the rural districts in larger volume, especially in the West.

Annual Inspection

SINCE the war broke out the building trade has received a shock. The speculative builder, like the real estate gambler, has been delegated to the scrap heap. Let's hope he will stay there and never revive. Factories were for a time run on short time, wages were cut down and persons living in 6, 8 or 10-roomed houses, and only really using 3, 4 or 5 rooms, suddenly began to double up. This resulted in an increase in the number of vacant houses. In many cases tenants got after their landlords for some reduction in rents, or demanded that certain repairs be made around the house. In all it looked as if for once in history, the tenant had his or her landlord "by the nose." Some tenants began to demand new plumbing and if such was not forthcoming, threatened to leave the house. These threats put a cold shiver down the back of the average landlord. Just recently The Sanitary Engineer has spent much time in looking over the situation and finds that 8 out of 10 "Curbstone Plumbers" are busy and 8 out of 10 real sanitary and heating engineers are almost closed up. Why? Because the former are catering to the landlord with cheap, poor jobs, which are, 90 per cent. of them, not installed according to their city or town by-law, while the latter cannot afford to risk their reputation, and will not be a party to breaking the law by installing inferior work, although this means loss of business to them. The Sanitary Engineer wishes to record its firm conviction that the only way to overcome this evil is to insert a clause in every town or city by-law, requiring that all plumbing or constructions of any description which would come under the jurisdiction of the medical officer of health or sanitary engineering department, shall be inspected annually; that an official record be kept and referred to at every annual inspection; that any such installation found to have been subjected to addition, reconstruction or alteration, and for which there had been no permit granted, shall be traced to the party doing such work, and that each party shall be summoned before the court and heavily fined. The owner, too, should be made a party to the offence. Further, The Sanitary Engineer believes that every new installation or reconstruction should have a substantial brass name-plate bearing the name of the party who installs such work and affixed in such a way as to form part of the fixture, the plate to be not less than 2 inches long and ½ an inch wide. These plates can be bought for a few cents and would not only inform the inspector who had done the work, but would also show the owner that those installing the work were not likely to be ashamed of it.

Association Work

THERE are quite a number of men in the trade who could be a power for good, both to themselves and their fellow-craftsmen, if they would only join their trade association. To associate is in other words to unite, and unity is strength. The Ontario Society of Domestic Sanitary and Heating Engineers consists of a body of men who have the general welfare of the whole trade at heart. We can point to several matters which have been brought to a very successful issue as a direct result of the efforts of members of this society—matters from the settlement of which every person engaged in the trade will derive and is deriving a benefit. The members of this society have spent their time and money freely that all may benefit; they have worked with a right down good-will. Now, fellow-craftsmen, why not help the good work along? Why not co-operate and thus unite in creating history which in the very near future will stand out as being something worth while, and thus share in the honor of being one who has assisted in the good work.

A post card to the secretary, G. F. Frankland, 1093 Bathurst Street, Toronto, will bring you all the particulars as to membership, etc. One thing to bear in mind is, that no person is asked to join the society unless he is out to give as well as to receive a square deal. What is wanted is men who are desirous of doing with others as they would be done by, customer and competitor alike.

Editorial Briefs

BE STRONG.

* * *

UNITY IS strength.

* * *

DON'T FORGET the Ontario Convention.

* * *

DON'T NEGLECT reading every article in the Spring Number.

* * *

DON'T FORGET that The Sanitary Engineer is the only paper published in the interests of the trade in Canada.

* * *

THAT IT takes responsibility for all that appears in its pages.

* * *

THAT IT speaks out fearlessly for the trade as well as the public.

Getting After New Business

Another Suggestion For an Advertisement Which Could Not Help But Pull Business If Inserted in a Country Newspaper.

FOURTH ARTICLE OF THIS SERIES.

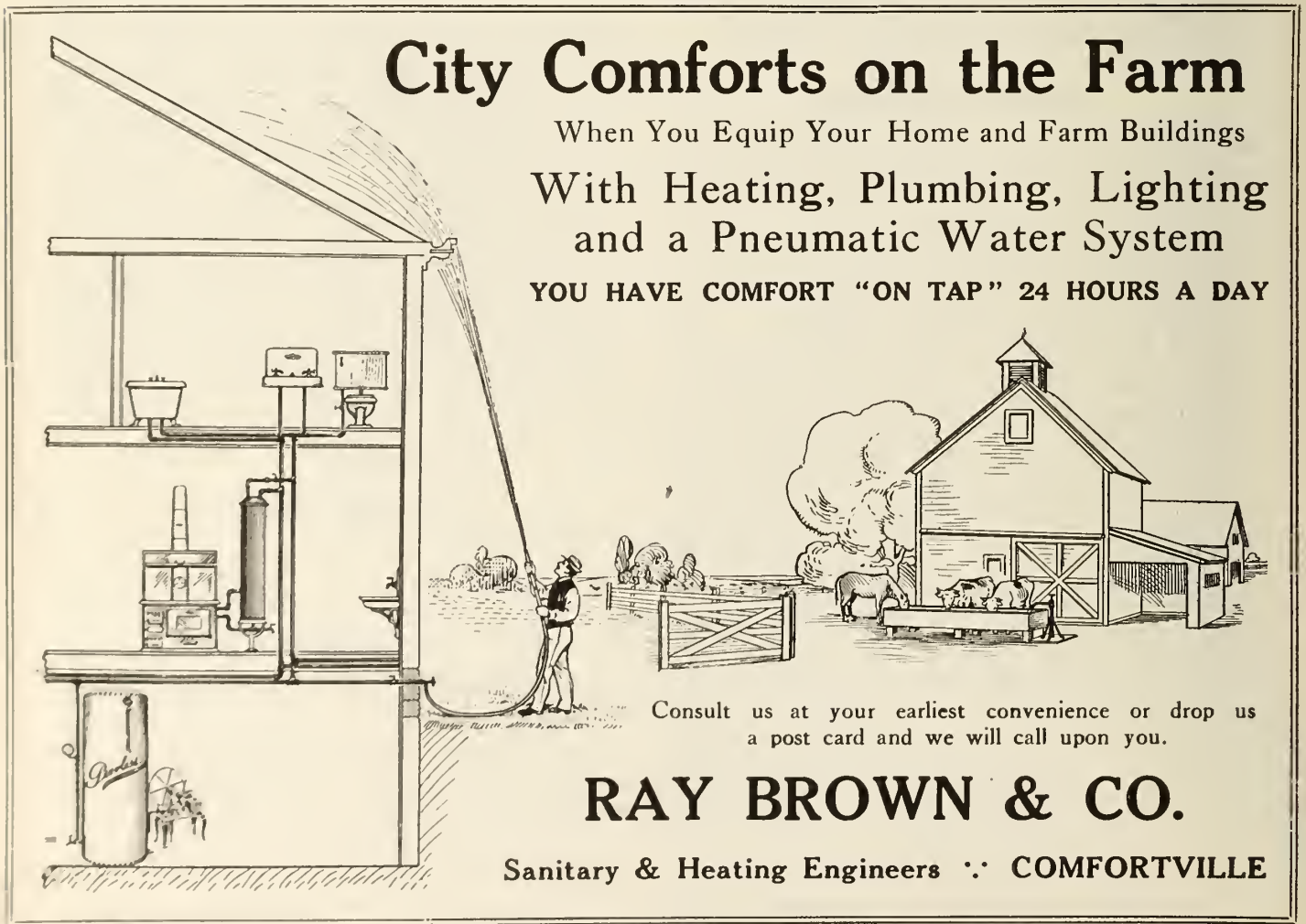
SINCE our last issue was published we have taken up the matter of advertising with quite a number of manufacturers. The question is one to which all live manufacturers pay a great deal of attention.

They realize that to develop big and lasting business one must advertise. These manufacturers spend thousands of dollars upon cuts and electrotypes with which to illustrate their advertisements, and, realizing what these cuts cost, they know it would be next to an impossibility to expect the sanitary and heating engineer to advertise successfully without illustrated advertisements. Quite a number of manufacturers are at the present time ordering cuts that can be placed at the disposal of their customers. Sanitary and heating engineers can obtain cuts from their jobbers or the manufacturers whose goods they handle. We herewith show an illustrated advertisement which if inserted in some local country newspaper could not fail to draw business. The illustration shown is of such a style as is bound to catch the eye of the reader.

These advertising suggestions can be reproduced just as attractively in the newspaper, and are gotten up so as to give our readers some idea of style, etc. The size, too, is suitable for a country newspaper. We would advise our readers strongly to procure cuts such as these, and which will be shown in The Sanitary Engineer from time to time.

Every sanitary and heating engineer knows full well what splendid improvements could be made on most farms. There is not only the sanitary equipment of the home to consider, but there is also the saving of labor which can be effected around the farm buildings. Cattle can be watered automatically, the pneumatic water system has solved this problem; tanks can be placed in almost any location free from frost, and pipes can be laid to all the outhouses. Just look at the illustration and see how easily a fire in a barn or outhouse could be put out at the start. This stoppage of fire alone would save the total cost of the installation ten or twenty times over.

No "tank in the attic" could do that. A tank in the attic, moreover, is a continual source of risk of a "shower bath" caused by its giving out and leaking. Then, again, there is no limit to these pneumatic water systems; they can be added to from time to time, and the cost of maintenance is never actually realized.


City Comforts on the Farm
When You Equip Your Home and Farm Buildings
With Heating, Plumbing, Lighting and a Pneumatic Water System
YOU HAVE COMFORT "ON TAP" 24 HOURS A DAY
Consult us at your earliest convenience or drop us a post card and we will call upon you.
RAY BROWN & CO.
Sanitary & Heating Engineers ∴ COMFORTVILLE

The above illustration is taken from a drawing loaned us by The National Equip ment Co., Ltd., Wabash Ave, Toronto.

The Principle of Elbow Pattern Developing

A Complete Course, Treating in a Simple Way, the Art of Elbow Pattern Developing. Specially Written for Those Who Have Only Received a Limited Geometrical Education.

By EDWIN NEWSOME

THUS far every article in this series has only taken up the question of developing elbows of circular formation. In this as in future articles we will show how various shapes of elbow patterns are developed.

This article takes up the question of developing patterns for oval-shaped elbows. These are used for furnaces, sometimes for warm air, as well as smoke pipes. If for the latter either galvanized iron or Russian iron should be used, for the former only bright tinned plate is the best material. When using heavier iron than 18 gauge for smoke pipes, it is usual to rivet the joints, not to lock or seam them. This applies whether galvanized or Russian iron is used.

We will now show how a three-piece oval elbow is to be developed. The first step to take in elbow developing, as previously stated, is to draw a plan and elevation. Fig. 1 shows an oval elbow with the oval running horizontally. Having decided what width the elbow is to be, proceed by drawing the elevation and dividing it up in the same way as described when an ordinary 3-piece elbow is to be made up.

Next determine the length of the oval. We have here shown a half plan in Fig. 1, A & B being the width, C & D being half length of oval.

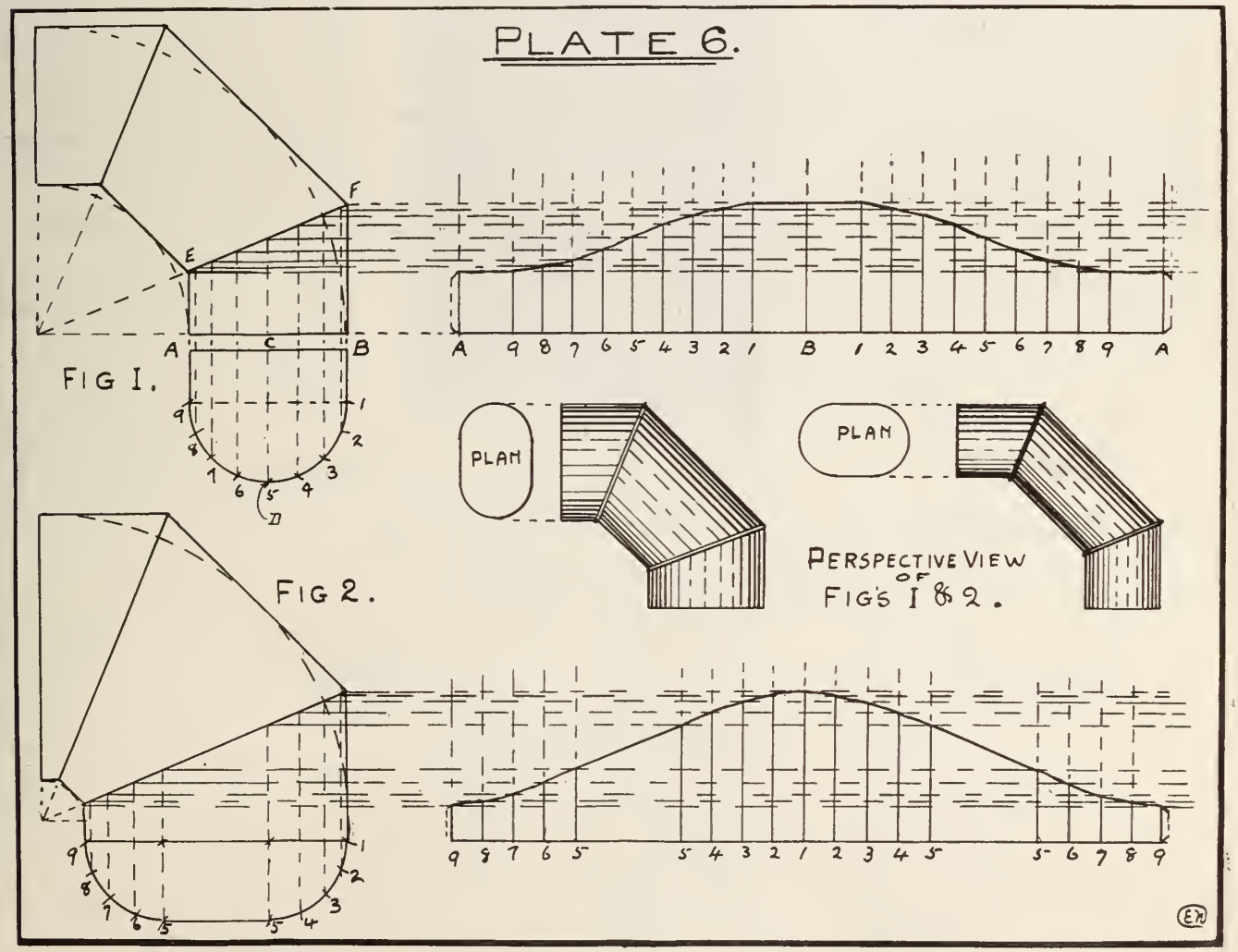
The distance between A 9 and B 1 is straight and must therefore be provided for in addition to the ends which are complete half circles. The next operation is to divide the half circle as shown in plan and erect dotted lines until the first mitre line E F is reached. Now draw a stretch out line as shown at A A in pattern. Beginning at B on this line transfer the measurement from B to 1 on plan, and on, until 1, 2, 3, 4, 5, 6, 7, 8 and 9 have been transferred. Repeat backwards, thus completing the measurement for the length of material required. Next step will be to erect lines upward as shown from A, 9, 8, 7, 6, etc.

We will now turn to the elevation. Place the straightedge at the various intersections on the mitre E. F. and draw dotted lines as shown until each vertical line with corresponding figure is cut. It will be seen that 1. B. 1. is in a straight line with point F and at right angle with F. B. 1 on plan. This shows the flat portion of the oval at the heel of the elbow as does A. 9, which is the flat part of the oval at the throat.

Fig. 2 shows half plan and full elevation of a 3-piece oval elbow with the oval shown vertically.

It will be seen that these two elbows, Figs. 1 and 2

(Continued on page 30.)



Practical Course for Sheet Metal Workers

ARTICLE No. 13 OF SERIES

By CHARLES SEIVERS

IN Figure 1 we have the side view, end view, and plan of a box or pan; as shown, it is tapered on both ends and sides.

In making an article of this nature the straight depth, as at C-E and D-F, is usually given, leaving the slant height or depth to be worked out.

In doing this, it must be remembered that the side view will show the slant height of the ends, as shown by A-C and B-D, and that the end view will show the slant height of the sides, as shown by G-K and L-H.

Having laid out the side and end views, we proceed to lay off the pattern.

In laying out pattern in this case we will make the two sides and bottom in one piece and seam in the two ends.

Draw a line as A-B on pattern equal in length to A-B on side view, parallel to A-B: draw C-D, and at a distance from it equal to the slant height of the side, as obtained at G-K or H-L on end view.

On A-B mark off the distanees or differenees in top and bottom, as shown at A-E and F-B on side view, and draw lines from these points at right angles to A-B, cutting C-D, as shown; then draw lines connecting A-C and B-D, completing pattern of one side.

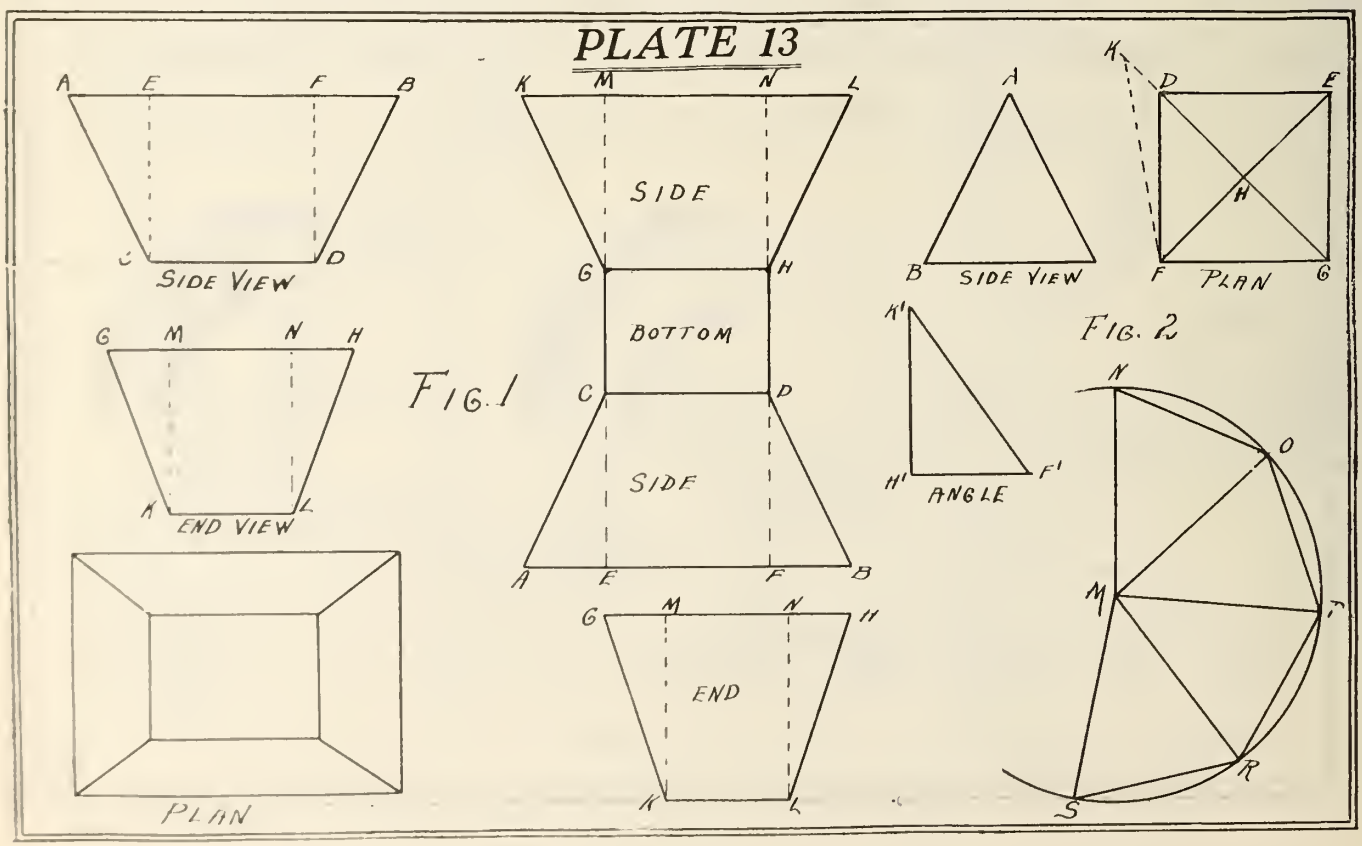
At right angles to C and D draw lines, making them equal in length to the width of bottom, as shown at K-L on end view, and draw a line connecting them, as shown by G-H. This will give pattern of bottom, as outlined by C-D-H-G, parallel to G-H, and at a distance from it equal to the slant height of the side as obtained.

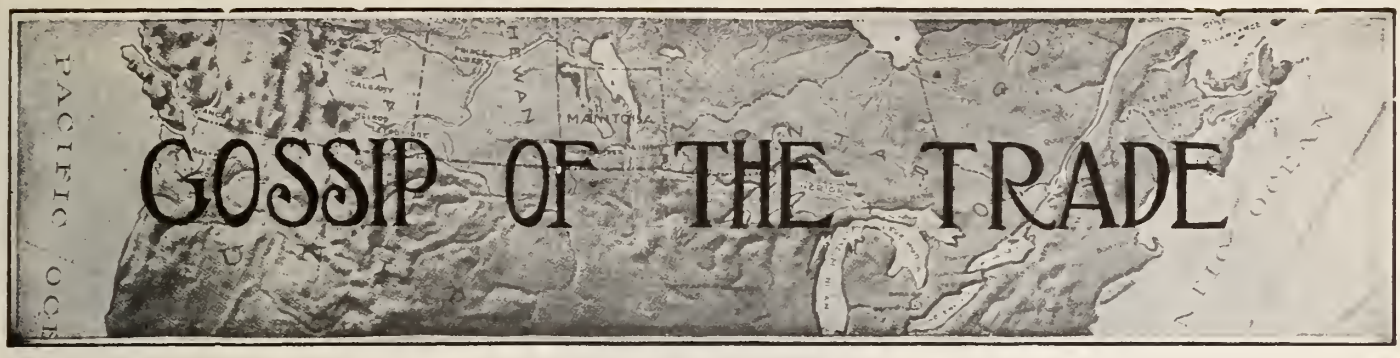
At G-K or H-L on end view draw a line, as shown at K-L, from G and H, and at right angles to G-H. Next draw two lines, as shown by G-M and H-N; from M and N set off a distance equal to A-E or F-B on side view. Then draw lines from these points, as K-C and L-H. This will complete outline of pattern for two sides and bottom.

The allowances for seams and wired edges are next set off. On the two outer edges, as K-L and A-B, are allowed the edge for covering the wire, and on the sides, K-G-C-A and B-D-H-L, are allowed the edges for double seaming, and the pattern for the end piece is made in the same manner as the side piece. On the pattern for end piece the line G-H is equal to width of top, M-K, and N-L are equal to A-C or B-D on side view, being the slant height of the ends, and a distance apart equal to K-L on end view. The lines G-K and H-L complete the pattern. The allowance for edges on G-H is allowed the edge for wire. On the other three sides, G-K, K-L and L-H, a single edge only is allowed to enter the double edge on body.

In Fig. 2 is shown a side view and plan of a pyramid, and a method of drawing pattern for same. A-B-C shows the side view and D-E-F-G-H the plan.

At right angles to F-H draw a line as H-D extended to K-, making it equal in length to the height of side view, as shown by dotted line drawn from A to base line B-C. Now draw a line connecting K and F. (This angle is shown in solid lines at angle and outlined by H'-F' and K'.) With K-F as a radius, the point M as a centre, draw an arc; on the arc mark off four spaces equal to B-C, as shown by N-O-P-R-S. A line drawn through these points and from each of these points to M will complete the outline of the pattern as shown.





GOSSIP OF THE TRADE

Making History.

We have in our time reviewed quite a number of convention reports, and, without casting any reflection upon those sent us in the past, we certainly must compliment the report just recently received from the West.

The Canadian Institute of Sanitary Engineers have just issued their report for 1913 and 1914. It is a cloth bound volume in blue and gold, size 6 x 9, and of 112 pages.

There are proceedings reported in this book which will go down in history as the beginning of things done, of actual progress made. The chief points were published briefly in The Sanitary Engineer of last June. There still lingers in our mind the remembrance of the report as forwarded to The Sanitary Engineer, which at the time showed how hard the members of this institute must have worked, but to get a full verbatim report is a pleasant surprise, even though a little late.

This report is profusely illustrated with photos and drawings, some of which have never appeared in any other paper except The Sanitary Engineer, and which are particularly interesting because they are the actual tests and results of actual Canadian experiments and indisputable facts.

Besides the data mentioned, the institute have also drawn up a by-law, which contains some very commendable clauses.

A Book of Revelation.

Above is the title of a very interesting illustrated catalogue which is being issued by the Gloria Light Co., Chicago. It describes their lighting and heating system, for which gasoline is used. They claim it to be one of the most efficient systems on the market.

Those sanitary and heating engineers who are looking after the farmer for new business will do well to become acquainted with such appliances, and thus secure not only the sanitary and heating contract, but also that for lighting. For further particulars, write the Gloria Light Co., 1274-1276 Washington Boulevard, Chicago.

Arthur Darling Died This Morning.

Arthur J. Darling, president of the firm of Darling Bros., Limited, engineers and manufacturers of Montreal, died at his residence, 73 St. Luke Street, Montreal, Friday, March 5.

Mr. Darling had been in ill-health for some time, but the termination of his illness was unexpected. He was fifty-two years of age, and the son of the late

Late A. J. DARLING, Montreal.

Thomas Darling, accountant of this city. He is survived by his widow, one daughter and two sons; the children all being young.

Mr. Darling was a member of the Montreal Curling Club, and president of the Whitlock Golf Club, Hudson Heights, which he was instrumental in organizing.

New Partnership.

Mr. John Conley, Renfrew, has taken into partnership two of his efficient employees, Messrs. R. A. Gould and J. Little. John Conley & Co., plumbers and steam-fitters, is to be the new name of the firm. Messrs. Gould and Little are both first-class tradesmen who have shown their worth and the business interests of Jno. Conley & Co. will now be well taken care of.

Bombs Peddled as "Lubricant."

Is there a quiet and widespread scheme abroad in the Dominion for the destroying or damaging of public institutions and factories, and presumably many lives as well? This is the question that is occupying the minds of a number of London citizens at the present time. And that the Provincial authorities have been warned of some such dastardly intent on the part of a person or persons yet unknown, seems to be proved by the following letter, received Tuesday by the superintendent of the Convalescent Home, 444 York street, from Dr. R. W. Bruce-Smith, provincial inspector of institutions and factories:

"Sir—I am instructed to advise you that notification has been received from high authority that agents have been instructed to call on engineers and plumbers at different institutions and factories throughout the Dominion of Canada, asking the institution or firm to try a lubricant, of which they will leave a sample in a box. It is reported that this box, when it is opened, will explode with great power, and do damage to persons and buildings, as instead of being a lubricant it contains a very high and powerful explosive.

(Signed) R. W. Bruce-Smith."

Business Change.

The interest of Mr. Barber in the firm of Lockhart & Company, plumbers, steamfitters and electrical contractors, Galt, Ont., has been taken over by Mrs. Lockhart, mother of Capt. T. Lockhart, who is with the First Canadian Contingent. The business will be continued by her under the management of Mr. A. Lockhart until Capt. Lockhart returns from the front.

New Company.

Efficiency Boiler Heating Co., has been incorporated at Ottawa, Ont., with a capital of $100,000, to carry on the business of manufacturers of furnaces, stoves, ranges, etc., at Ottawa, Ont. Incorporators—W. N. Graham, H. Hastings Short and H. G. Rouleau, all of Ottawa, Ont.

"Some Turtle."

Leamington, Ontario.—An immense turtle which became drawn up against the intake pipe at the waterworks cut this town off from its water supply for several hours recently. So large was the turtle that its head alone was of sufficient bulk to stop the pumps. The animal is estimated to have weighed 500 pounds.

No doubt the above communication has its serious side, but it reminds us of the story told, where two sailors entered a restaurant and, upon being served with the first course, asked what it was. The waiter replied that it was soup. Says the jolly tar to his mate: "Well, Bill, we've been sailing in soup all these years and didn't know it."

How long have the Leamington folk been partaking of turtle soup at every meal and not known it?

Partnership Dissolved.

F. L. Weiler has retired from the partnership with Jas. F. Bird, in the plumbing and heating business. Main street, Grimsby, Ont. Jas. F. Bird will carry on the business in the future.

A New Bulletin.

The Anglo-American Sanitary Correspondence College are issuing a very interesting bulletin. In it they show the work they are doing. Those who wish to become more conversant with the actual results attained by the students of this college should drop a postcard to 10-12 W. Ontario Street, Chicago, Ill.

River Pollution Must Cease.

The Eganville Public School Board have been warned by Dr. P. J. Maloney, district medical health officer, to cease emptying untreated sewage into the Bonnechere River. This information was conveyed to the local board of health at their meeting recently.

Sanitary Equipment for Fort Francis Recruits.

The old school building on Scott Street recently placed in the hands of the recruiting officers for use as a barracks and armory has undergone some extraordinary changes since the advent of our martially-inclined boys. Under the supervision of Lieut. Parry, who in times of peace is a skilled engineer of local renown, they have by their own handiwork enlarged the basement, giving them commodious quarters for lavatory purposes. Three large shower baths have been installed, together with hot and cold water, by the local firm of East & Corrin, and this innovation is keenly appreciated by the soldiers, as after their trying physical exercises they can bathe at will. The project of making these almost necessary changes is a worthy one, especially from a sanitary standpoint, and credit must certainly be given to the local recruits.

When writing to those at the front instructions below should be carried out:

Addressing of Mail.

In order to facilitate the handling of mail at the front and to insure prompt delivery, it is requested that all mail be addressed as follows:—

(a) Rank .....
(b) Name .....
(c) Regimental Number .....
(d) Company, Squadron, Battery or other unit.....
(e) Battalion .....
(f) Brigade .....
(g) First (or Second) Canadian Contingent .....
(h) British Expeditionary Force .....

Army Post Office,

LONDON, ENGLAND.

Montreal Sanitary Engineer "Passed On."

William Budd, who conducted business at 155 Fairmount Avenue W., Montreal, died Thursday, March 4. He had been in business for himself four years.

Bureau of Public Health, Saskatchewan, Seeks Statistics From All Municipalities.

Officials of the Bureau of Public Health have been busy completing and closing the records of work done during the calendar year 1914. The medical health officer and the secretary-treasurer of each health district, which means every town, village and rural municipality, are being asked to supply full information regarding such matters as sanitary work undertaken throughout the year: water supply, and whether it is derived from river, lake or wells; its location and method of distribution; drainage, if any.

Taken Over Plumbing Department.

J. C. Stewart, who for some time back has been in charge of the plumbing and heating department at Worden's hardware store, Weyburn, Sask., has acquired that branch on his own account. He will conduct the business at the same address for the present.

Opening Tinshop.

Robert Curley, Knowlton, Quebec, intends opening a tinsmith's shop at an early date.

Valve Contract Secured.

The Kerr Engine Works, Walkerville, Ont., have been awarded a contract for a number of valves by the City of Fort William, Ont.

Building Damaged

Coaticook, Que.—Smoke and water did considerable damage on the morning of March 8, to the building on Child street owned by C. A. Kennedy, furnace maker.

Examiners Appointed.

The new licensing by-law which went into effect in Toronto some time ago required that there be a board of examiners appointed; see clause 34B of the by-law which appeared on page 25, March 1st issue of The Sanitary Engineer.

The gentlemen appointed are W. Meadows, chief plumbing inspector of Toronto, representing the medical office of health; L. Legrow, representing the domestic sanitary and heating engineers, and John Richards, representing the journeymen. All are men of unquestionable character and practical mechanics. "The Sanitary Engineer" is sure that the trade and public alike cannot fail to receive better service as a direct result of their appointment.

INTERESTING BOOKLETS.

The following booklets have been received for review by the Sanitary Engineer. They are all of special interest and deal with the various subjects, as their titles imply:

The Water Supply of Country Homes.

Public Bath Houses.

The Progress of the Public Bath Movement in the U.S.A.

Public Bath Houses and Swimming Pools.

Recent Examples of Hospital Construction in Europe.

All are written by the same author, Dr. Wm. Paul Gerhard, C.E., 30 East 42nd Street, New York, from whom all information may be had upon application.

Doings of the Toronto Society

One of its Members Join the Second Contingent—Presentation of Gold Military Watch —Address From the President—Made Active Member During Absence.

PARTINGS are not by any means 100 per cent. pleasant, though there are partings and partings. When H. Ruddick, sanitary and heating engineer, decided to serve his country in another sphere, he was given a hearty farewell and God-speed by the Toronto Society of Domestic Sanitary and Heating Engineers recently. Quite a large number of his fellow-members were present. The president of the association, T. B. Smyth, spoke a few appropriate words of appreciation, and in so doing, expressed the feelings of every member of the association in a practical manner by presenting Mr. Ruddick with a beautiful military wrist-watch, and in addressing the recipient he said:

"Brother Ruddick, the members of this association in presenting you with this little token of their esteem, desire to convey to you their appreciation of you as a man. The association is better to-day for your having been a member, and while we regret to lose you in the flesh, we feel that you will be with us in spirit. You have in times past assisted your fellow members in the fight for honest dealings; you have proved yourself to be an honorable worker, and we shall, as I stated before, miss you very much. We are proud of you, and trust that you will carry on the good fight in another capacity and, if you do, your country also will be proud of you. In addition to this little material token, we desire to inform you that you are to be maintained an active member of this association during your absence from us. We hope this dreadful war will soon be brought to an end, and that you will soon be amongst us again.

H. RUDDICK, Toronto,

Recently volunteered for service with the second contingent, now in training at the Exhibition Ground, Toronto.

Mr. Ruddick, as will be seen, enjoyed the full confidence of every member of the association, and not only his fellow members, but also a large number of his patrons, spoke very highly of him when asked how they liked his work.

The last big contract executed by H. Ruddick, sanitary and heating engineer, Toronto, was just finished before re joined for service at the front.

At the time he joined the military forces he had quite a number of contracts on hand, the last to be completed being the "Havelock" apartments, situated on the corner of Havelock and College streets, a view of which will be seen on this page. He was a regular reader of the Sanitary Engineer, and spoke very highly of it.

The Sanitary Engineer, too, wishes him God-speed and a safe return, knowing full well that he will not fail to fight for freedom from all kinds of enemies which business, and particularly the sanitary and heating business, is heir to.

ONTARIO CONVENTION, 1915.

The Ontario Society of Domestic, Sanitary and Heating Engineers will hold their fourth annual convention at their headquarters, Canadian Foresters' Hall, 22 College street, Toronto, April 22, 23 and 24.

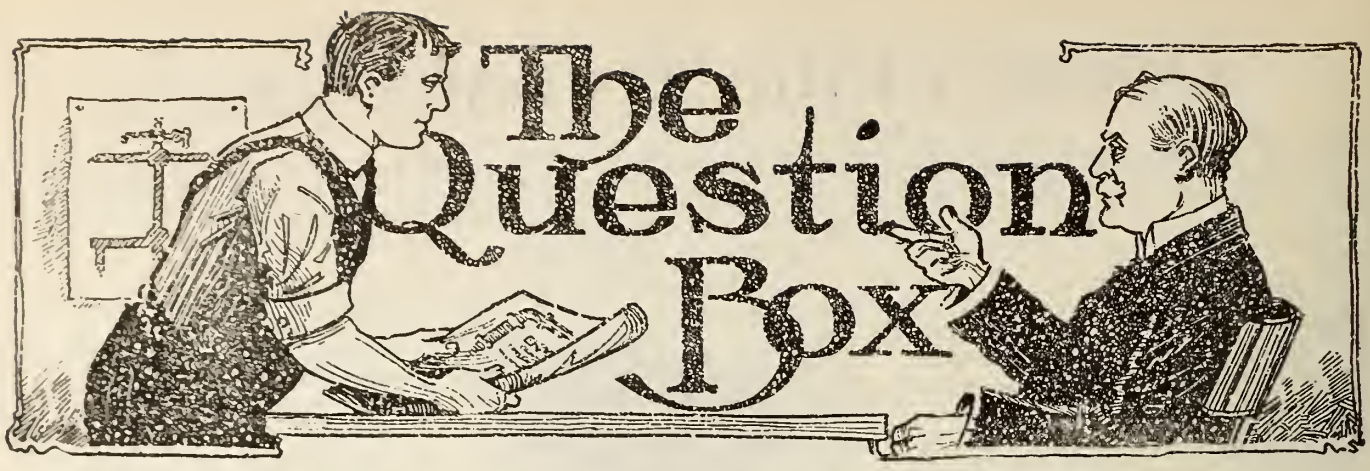
The Directors desire to see as many of the members present as possible. There will be a very interesting programme. The various committees have done a lot of work during the past year and their reports cannot fail to be of great interest to all.

Never in the history of the trade has there been more need for co-operation than at present. This is a period of moulding—moulding of the future. The association has in the past year prepared a new code of by-laws appertaining to sanitary engineering construction, which it is placing before the Provincial Government, in the hope of having it, or a similar by-law, embodied in the Provincial Health Act.

In times past and present, the country towns and villages have been the happy hunting ground of the "botch plumber" simply because there has been no real by-laws enforcement. These would-be sanitary engineers have installed work in small towns which, when a by-law has been put into operation, do not conform to it.

We feel, therefore, that a by-law should be embodied in the provincial health act as a protection for the public residing in these rural districts.

Other items of interest from the Ontario Society will be published in each issue of The Sanitary Engineer prior to the great event.



Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

Quinn Valves.

Editor, Sanitary Engineer:

Will you kindly inform me who handles the Quinn valves for use in a septic tank?

J. M. KOSID,
Kerrobert, Sask.

National Equipment Co., Ltd., Wabash Avenue, Toronto, are the sole manufacturers and inventors.—Ed.

* * *

Sweating Pipes Cause Trouble.

Editor Sanitary Engineer:

I am in a bit of a quandary and would like to know if you can advise me what to do.

In our building there are several laboratories placed one over the other, and the water is continually running, which causes the cold water pipes to sweat.

The floors are some kind of plaster, and the water seeps through. I am of the opinion that we will have to lay cement floors, so as to prevent the water from dropping through the floors.

J. C. C., Ottawa.

Replying to J. C. C., we may say that cement floors will not help in the least. What is required to prevent the trouble with pipes sweating is to cover all the pipes that are causing trouble with a good quantity of pipe covering such as is used for refrigerator work. A good line of steam pipe covering will do. This can be procured from any first-class jobber of plumbing and heating supplies, or from Johns H. W. Manville Co., Ltd., 19 Front street, east, Toronto.—Editor.

* * *

Will This Connection Work?

Editor Sanitary Engineer.—We beg to thank you for producing sketch of layout of boilers. It was an oversight on our part in not making it clear that these floors are occupied by different people. To use your layout in Fig. 3 would be unfair to the consumer on the ground floor.

We are desirous of fixing gas water heaters to each boiler, would the layout we submit herewith give satisfaction?

PLUMBUM.

We do not see how the consumers on the ground floor would be suffering in the least. How could they? It will be seen that the lower as well as upper boiler must both be hot before either floor can get any hot water, the heating connection is only connected to one boiler, as also is the cold water supply. If it were not for the fact that circulation has to be made through the tube of the lower boiler the consumer on the upper floor would likely get most of the hot water, look again "Plumbum."

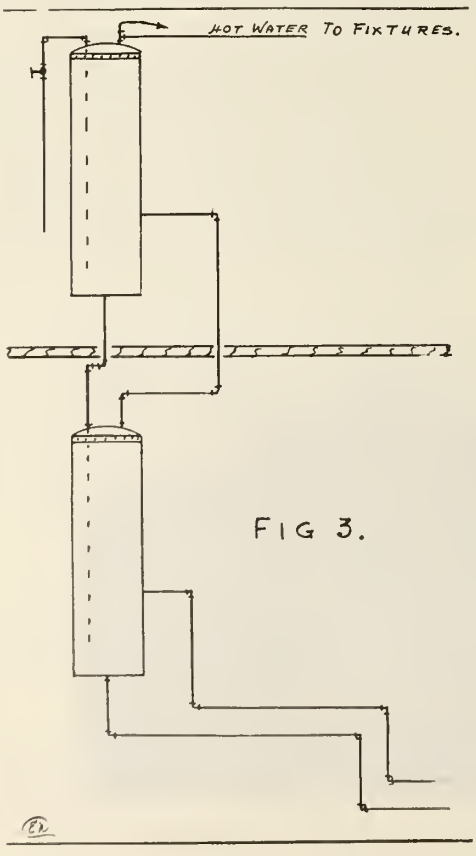


FIG 3.

We have submitted Plumbum's sketch in Fig. 2, but do not think this would be satisfactory for reasons as follows: We will suppose it is summer time and the heater on the furnace is cold, it would be possible to set up circulation through either boiler when heaters were lighted.

When independent means are to be employed to heat these two boilers those means must be isolated from each other, and at the same time the method of connecting the coil at the furnace must also be a little differently arranged.

Fig. 1 shows how the two gas heaters may be connected. It will be found that they are independent of each other as also are the hot and cold water supplies.

Fig. 4 also shows another method of connecting both the gas heater and furnace coil.

Though our enquirer did not state that there were two different people occupying the two floors, we surmised that such was the case. It is very seldom we see two boilers on separate floors, attached to one heater in a basement, excepting where there are two parties interested.

See page 30 for Figs. 1, 2 and 4.

Editor.

HOT WATER BOILERS A MENACE.

Clipping from St. Thomas Times: Boiler Inspector McCabe, of Detroit, sounds a warning of danger to users of kitchen range boilers and hot water boilers connected with radiators. "Without the installation of a relief valve a range boiler is a positive menace to life," declared McCabe. "We have no knowledge of the installation of these death-dealing instruments, my office usually hearing of their use only when the coroner is called to investigate the cause of the death. Many small office radiators are supplied with steam from small boilers that have not been inspected. These are dangerous."

EMPIRE

Nickel-plated Automatic Seat-operating Royal Flush Valve

with adjustable bar hinge and open back and front seat. Vitreous china syphon jet bowl.

A perfect outfit for school, factory or any public toilet. We guarantee our flush valves under all conditions when properly installed and we have a full range of combinations sufficient to allow of a selection for any service or building.

EMPIRE

Vitreous China Low-down Tank with Centre Push or Top Side-lever Action

Open back and front seat and vitreous china syphon jet bowl.

The vitreous china low-down tank makes the ideal tank for the private residence. It matches in color the rest of the bathroom fixtures, and is easily kept clean and sanitary.

We make a large range of tank combinations of every description and in any wood, and if required are prepared to match perfectly the woodwork of any room if a sample is supplied us.

Write for particulars.

Empire Manufacturing Company, Limited

LONDON, CANADA

Manufacturers of and Dealers in Plumbers' and Steamfitters' Supplies of All Kinds

PROBLEMS IN SHEET METAL WORK.

(Continued from last issue.)

on this line; mark off the distances B—1 1—2 and 2—D on line B—D of side view; draw lines from these points on line X—X and square from it on both sides. Divide front side in equal parts as shown by line P—S. From this line measure the distance to E or F and mark same on line B drawn from line X—X. As the distance from line P—S is same at E and F and at 1 and 2, mark same distance again on line 1 on both sides of line X—X. Measure from line P—S to point 2; in this case point G and H correspond to point 2. Mark off this distance from X—X on lines 2 and D; connect the points and complete outline of pattern of front as shown by B—D of side view.

To obtain pattern of the two sides, in this case both sides are alike. Draw a line as K—L. On this line mark off distances E to 1, 1—2, and 2 to G of front view; from these points on K—L draw lines at right angles, extending them out at least the width of pipe. Measure the distance from A to B and 1 to 1 on side view—in this case they correspond—and mark out from line K—L on lines K—M and 1—1; measure distance 2—2 and C—D on side view and mark off from K—L on lines 2—2 and L to N as shown. Connect points, completing outline of pattern of side.

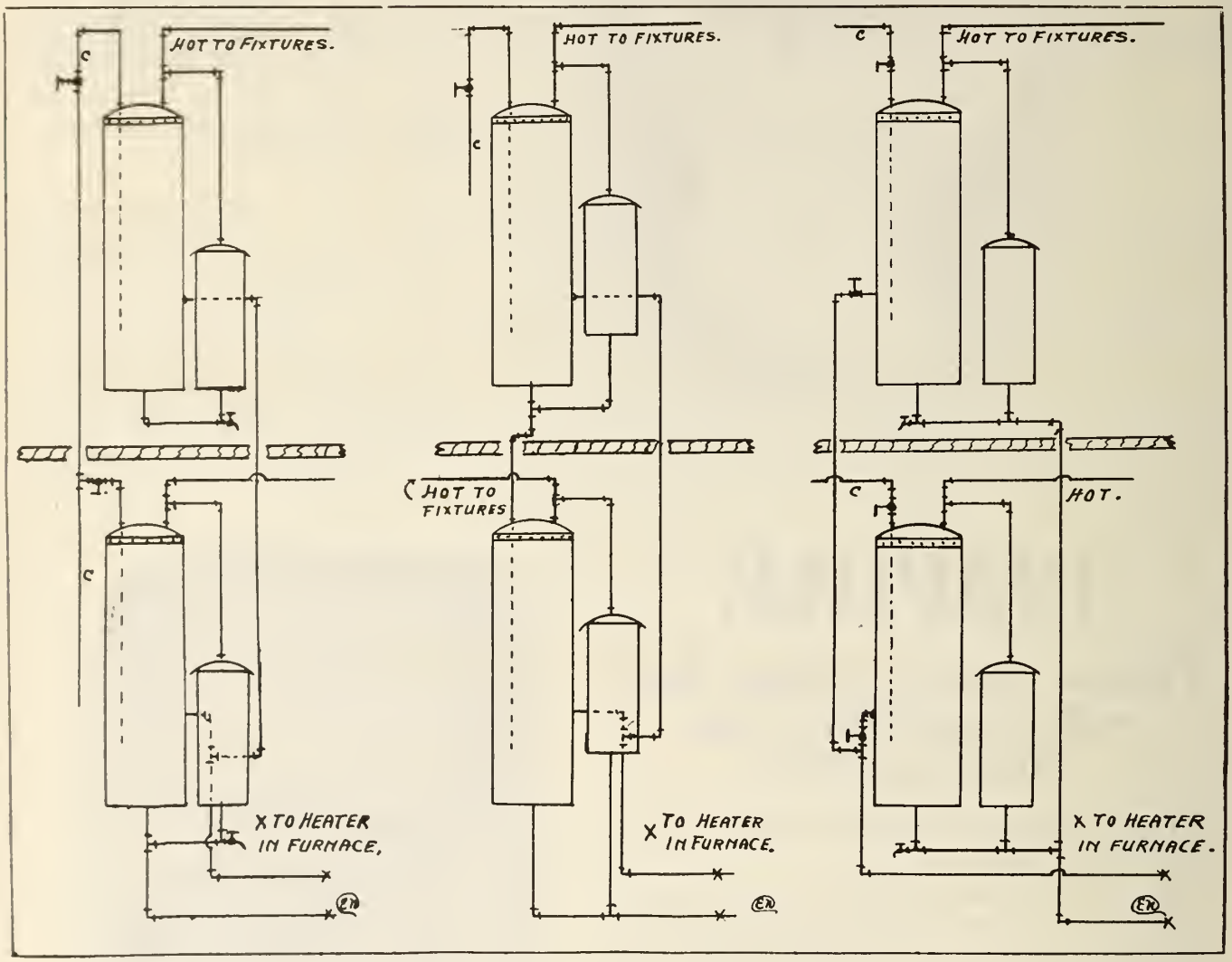


Fig. 1. Fig. 2. Fig. 4.

The Principle of Elbow Pattern Developing

(Continued from page 23.)

are both the same radius. Though they differ very much in the elevation they are exactly the same area. This style of elbow is very useful when running warm air pipes between joists and having to connect into a warm air stack at a right angle with the joists. The method to be adopted in developing this elbow shown in Fig. 2 is almost the same as is shown in Fig. 1. There are one or two points to watch, viz: the allowance for the flat portion of the oval. In Fig. 1 the plan shows a full half circle, half the allowance for the flat portion is shown as at B 1 and A 9. In Fig. 2 it is necessary to develop two quarter circles as shown 1 to 5 and 5 to 9. Then on the pattern these two portions of the oval are shown along with the circular portion as follows: From 9 to 5, one quarter, for ½ the throat of elbow; 5 to 5 flat portion, 5, 4, 3, etc., to 5 one-half circle for the heel, and 5 to 9 completing the other ½ for the throat. No allowance has been made in these patterns for the seams at the mitre.

Continued in next issue.

Quick Hot Water at a Big Saving — of Gas —

One minute after the

Stack Gas Water Heater

is lit it gives hot water at the tap

This is actually the most durable and long-lived Copper Coil Gas Water Heater made—it is the easiest and quickest to instal.

Cost but little more than the ordinary heater, but the extra cost is quickly covered by the savings effected.

Easily sold. **Big Profit.**

James Morrison Brass Mfg. Co.

Limited

93-97 Adelaide Street West, Toronto

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

THE RESULT OF QUALITY

Babbitt Metal, Bar Solder, Wiping Solder, Wire Solder, Lead Pipe, Bar Lead, Traps, Bends, Copper, Tin and Antimony.

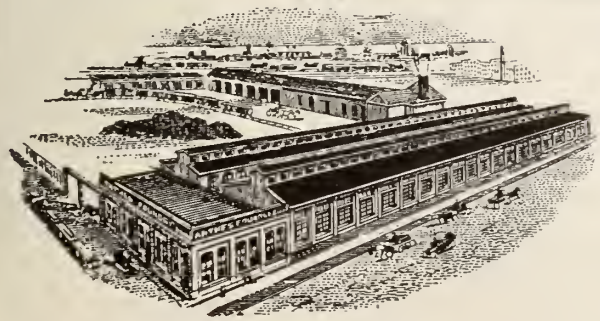
Let the goods prove their worthiness of a place in your stock. Send a trial order.

Hoyt Metal Co., Toronto, Ont.

New York, N. Y.; London, Eng.; St. Louis, Mo.

ANTHES FOUNDRY LIMITED

TORONTO **WINNIPEG**



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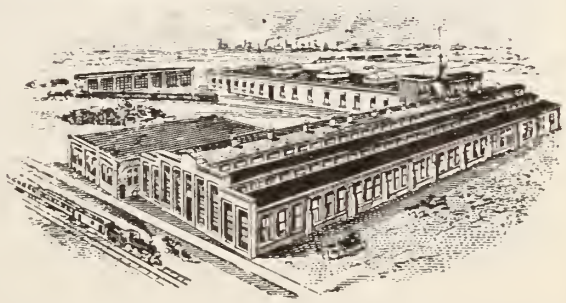
CAST IRON SOIL PIPE AND FITTINGS



ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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THE ANGLO-AMERICAN SANITARY CORRESPONDENCE COLLEGE

ENDORSED AND SUPPORTED BY

The United Association, The Examining Boards, The Master Plumbers' Assoc., Etc, Etc.

Courses in PLUMBING, SANITARY SCIENCE and ENGINEERING

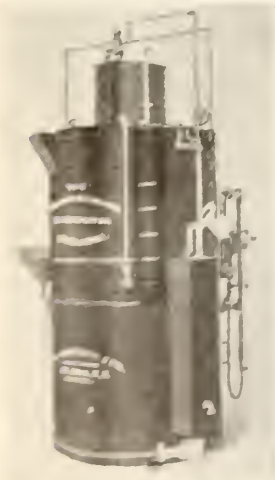
Our graduates in Sanitary Science and Engineering are admitted as members of the AMERICAN SOCIETY OF SANITARY ENGINEERING without further Examination

YOU STUDY RIGHT IN YOUR OWN HOME

RISK ONE CENT and write for free particulars to

Professor ARTHUR BATEMAN, Desk 6, 10-12 W. Ontario St., Chicago, Ill.

CUT OUT AND PASTE IN YOUR WORKSHOP



Mr. Plumber—Here is your chance

There are many profitable sales to be made in your locality of thoroughly guaranteed lighting systems.

We have hundreds of "Scientific" Acetylene Generators in use in Stores, Churches, Residences, Hotels, etc.

It will pay you to get busy at once.

Send for circular and go after the business.

P. Campbell & Company St. John, New Brunswick

Manufacturers

Condensed or "Want" Ads.

FOR SALE

FOR SALE—PLUMBING, HEATING AND tinsmithing business in the best town in Western Ontario. Town is growing fast. Apply by letter to Box 92, Sanitary Engineer, Toronto, Ont.

FOR SALE—$1,000.00 INTEREST IN PLUMBing, heating and tinsmithing business in rapidly growing Ontario town. Full supervision of shop with good salary. Must be an A1 mechanic, with business ability. Present owner has other interests. This is an A1 opportunity. Apply by letter to Box 93. Sanitary Engineer, Toronto. (6)

WANTED

WANTED — POSITION WITH PLUMBING and heating concern by reliable, practical man —previously employed as superintendent. Estimating, laying out work, etc. Address—"Position," c/o Sanitary Engineer, Montreal.

TECHNICAL BOOKS

ELECTRIC WIRING AND LIGHTING. BY Charles E. Knox, E.E., Consulting Electrical Engineer, and George C. Shaad, E.E., Formerly Associate Professor of Electrical Engineering, Massachusetts Institute of Technology, Professor of Electrical Engineering, University of Kansas. 195 pp., 170 illus. Cloth binding. A practical guide to approved modern methods of lighting by electricity and of installing conductors for the transmission and utilization of electricity for power, lighting, heating and other uses. Price, postage paid. $1.00. MacLean Publishing Co., Ltd., 143-53 University Ave., Toronto.

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FOR THREADING PIPE OR BOLTS

KNOWN, USED, COMMENDED EVERYWHERE

PIPE MACHINES, both Hand or Power

HINGED PIPE VISES

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BARD ADJUSTABLE BUSHINGS

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THE ARMSTRONG M'F'G. CO.

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WRITE FOR CATALOG

$15.00 a Week for Your Spare Time

Do you want to make more money to get ahead, to get experience that will help you climb the ladder to success? We can help you by appointing you to look after the circulation of MacLean's Magazine and the Farmer's Magazine in your district. You can make $1 an hour if willing and wide-awake. The work is pleasant, healthful, and the training we give in selling will be invaluable to you.

Hundreds are doing this in their spare time. Others at first give spare time, but find it to their advantage to give it their entire time. If you desire to increase your income in this way, write us at once. We give you all the requirements for success, except the determination.

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Want Ads.

If you want a buyer for your business, or have a situation to fill or want a situation, send us a Condensed Advertisement. There is someone who is looking for a proposition such as yours. For two cents a word you can speak across the continent with a condensed advertisement in this paper.

Try it out.

Williams' Chain Pipe Tools

Send for free pamphlet

Improved "Vulcan"

With Double-Ended Reversible Jaws

"Two in one" at the price of one

—for Pipe, all sizes

"Agrippa" holding against.

Single Jaw for both Pipe and Fittings

Both with world-wide proof of efficiency and greatest worth.

Drop-forged, selected steel parts, machine tested, before shipping, to 2-3ds of advertised strength of chain.

Invaluable tools in all pipe work, for all pipe sizes.

J. H. WILLIAMS & CO.

Superior Drop-Forgings

77 Richards St.

Brooklyn, N.Y. City

Perfect Control of Pressure is assured when you install the

MUELLER
Reducing and Regulating Valves

MUELLER
Reducing and
Regulating V alv

D 13160

The 13160 type shown here is an exceptionally accurate valve on steam or water, or on air, oil and gas.

These valves are especially adapted for service on water where considerable reduction and close regulation are required and for steam heating systems for any pressure as low as 5 pounds vacuum.

Try these great valves. You will not be disappointed. We can assure you of their efficiency, accuracy and durability.

H. Mueller Mfg. Co., Ltd.
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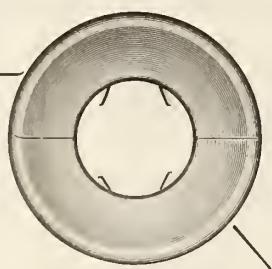

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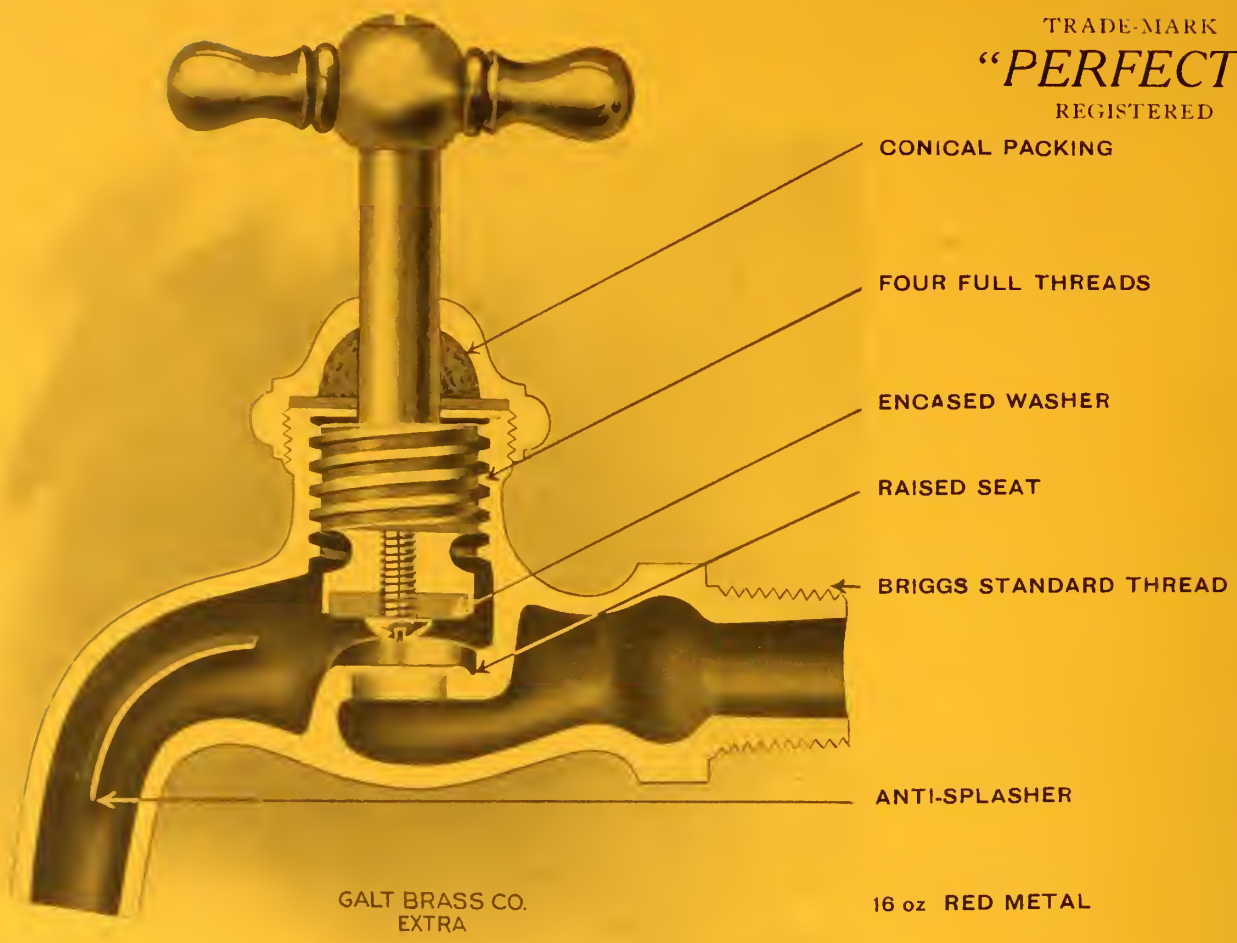

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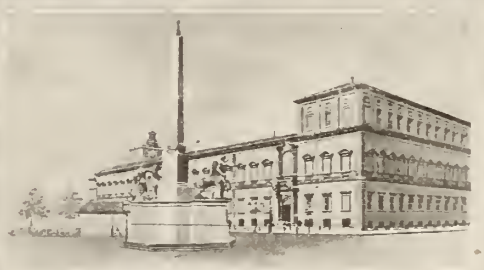

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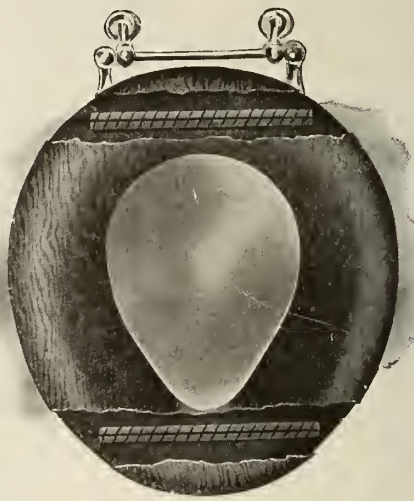

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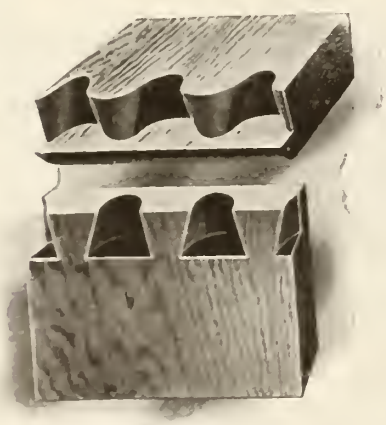

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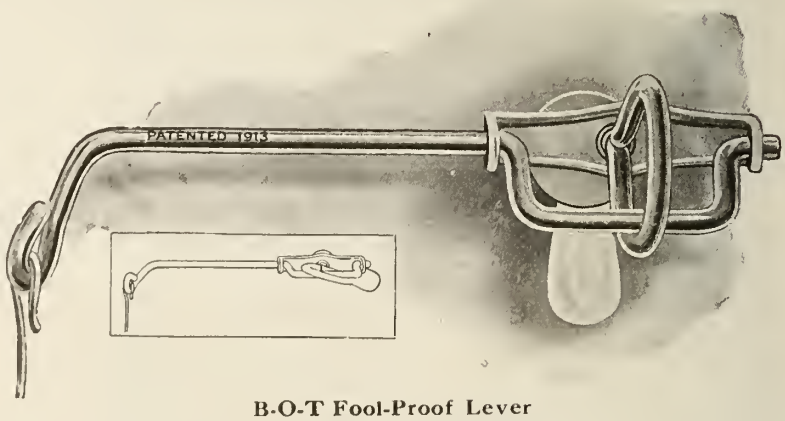

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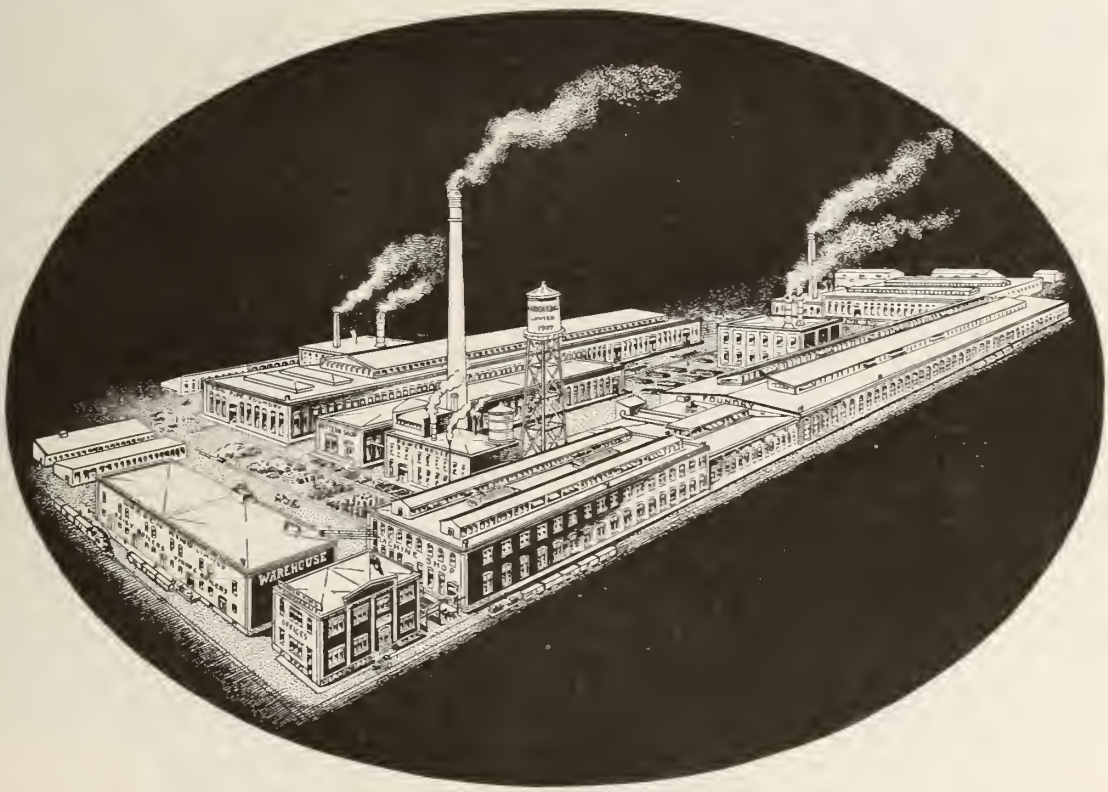

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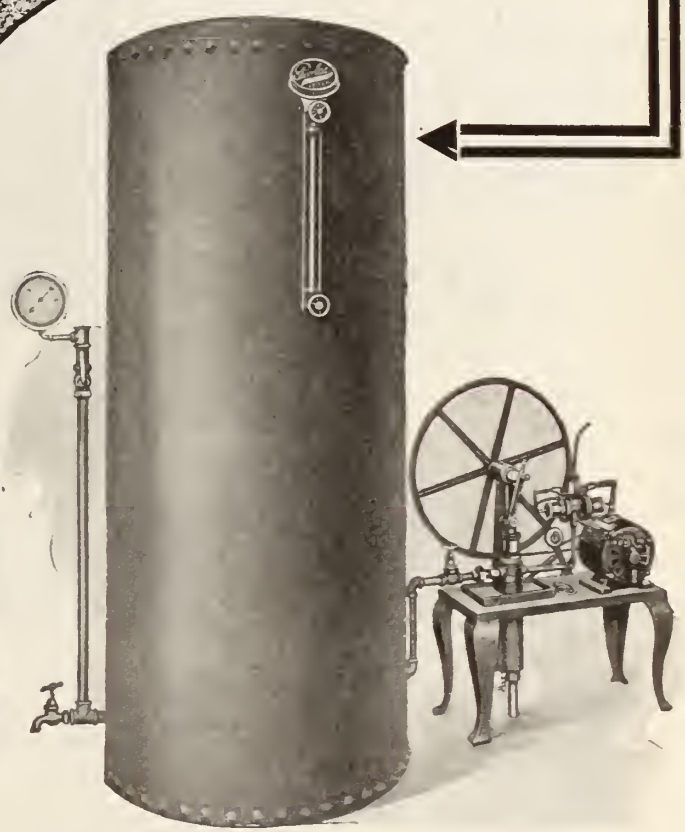

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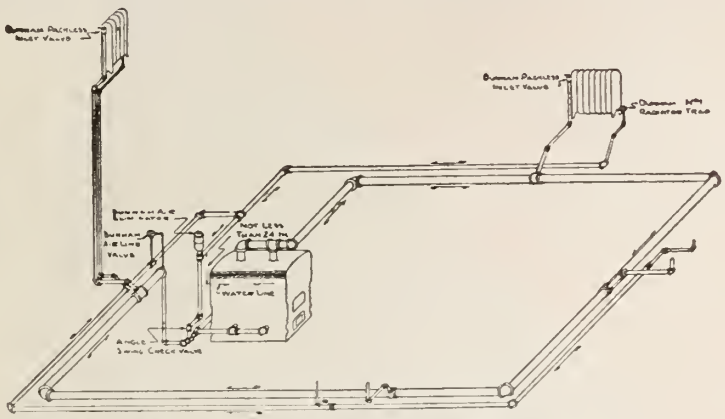

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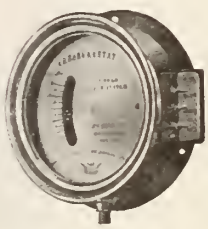

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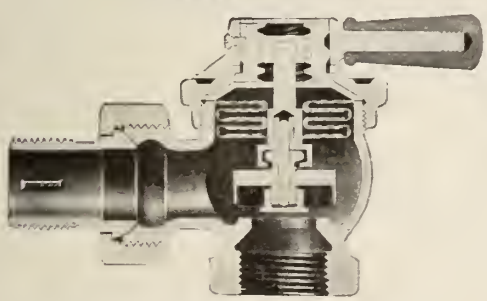

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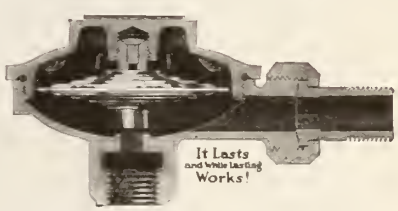

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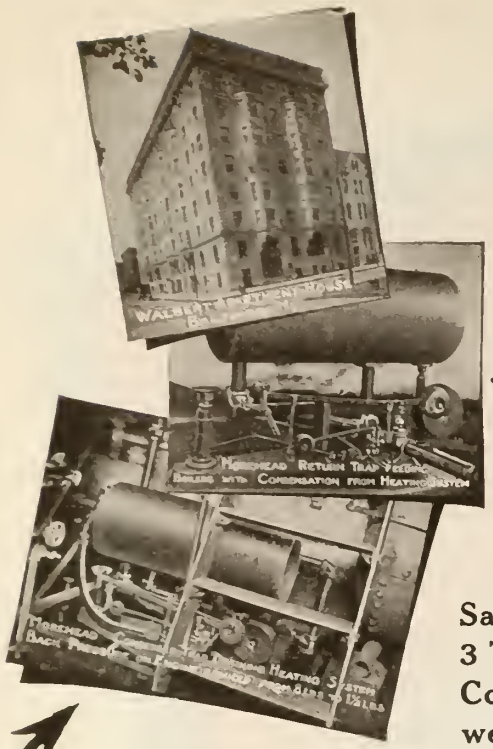

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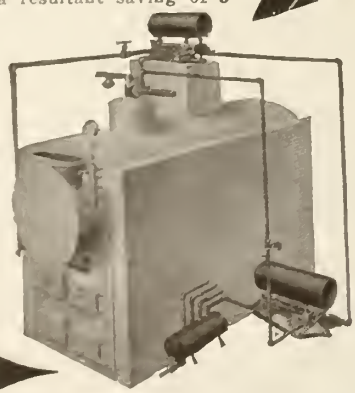

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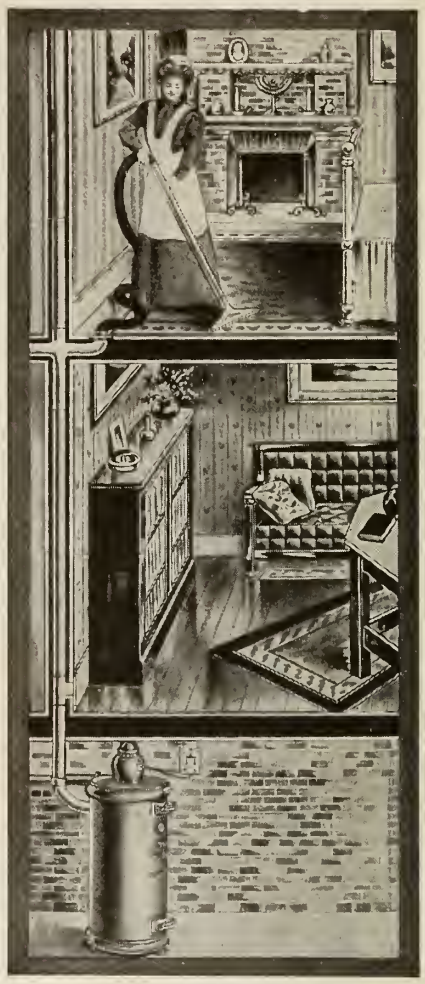

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JH 1417A	36x10	525	350	2	100J.H.	1630
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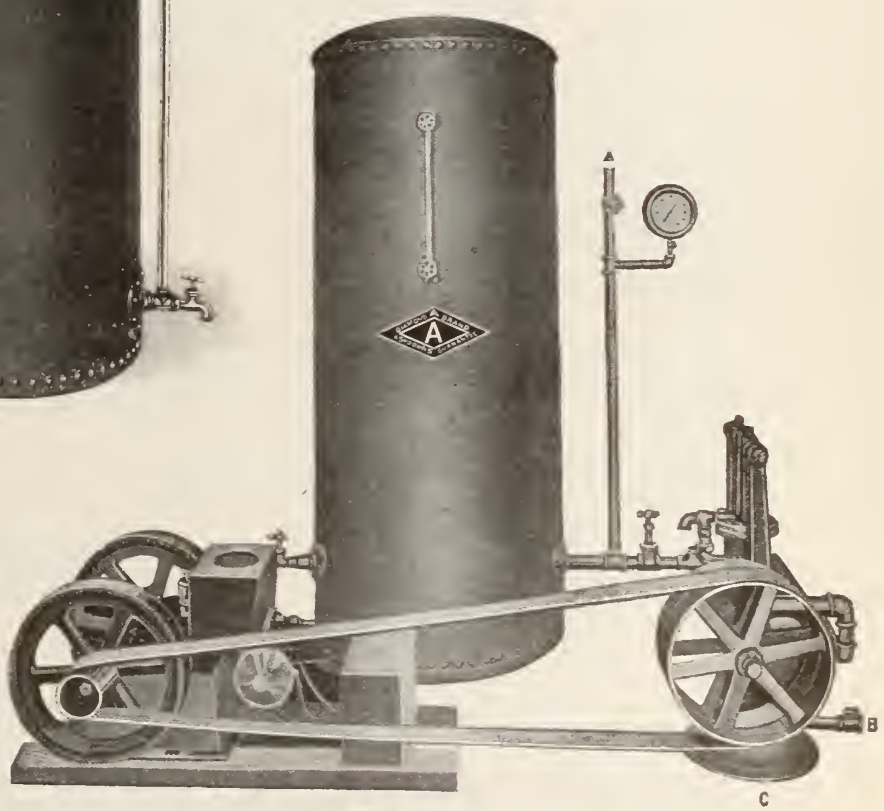

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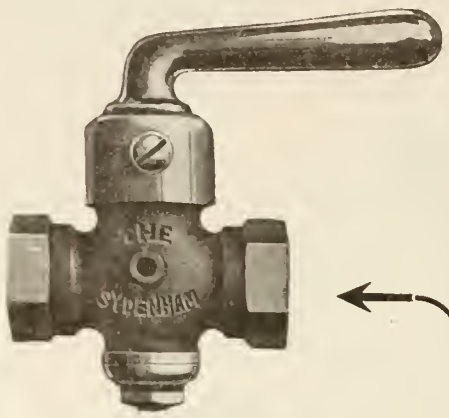

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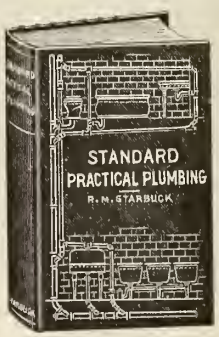

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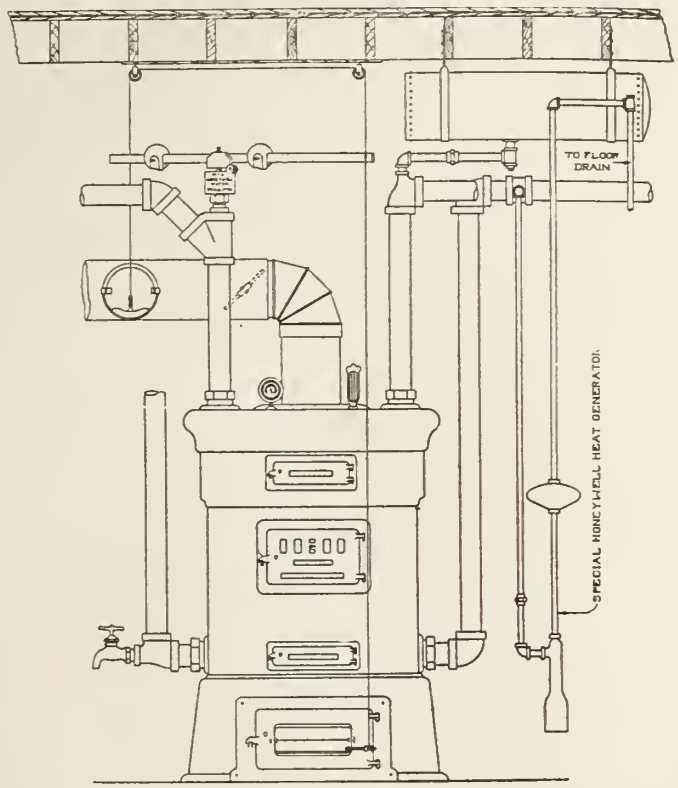

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We have been experimenting for some time with our special equipment for placing the tank in the basement and 124 hot water plants passed through the present winter equipped with it, including one in our own building, which has been inspected by many interested heating men during the past heating season.

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SANITARY ENGINEER

PLUMBER and STEAMFITTER of CANADA

Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, APRIL 1, 1915 No. 7

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EDITORIALS

Practical Sanitary Science—A Question of Overhead Expenses—Turned Down New Business—The Coming Convention—Signs of Improvement—Editorial Briefs.

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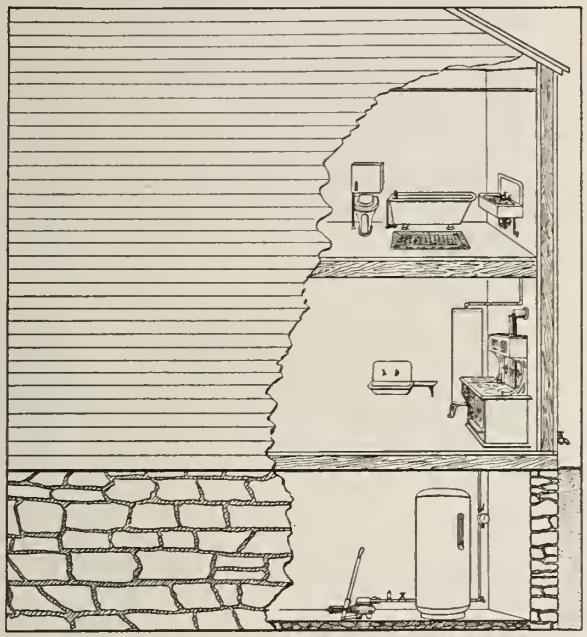

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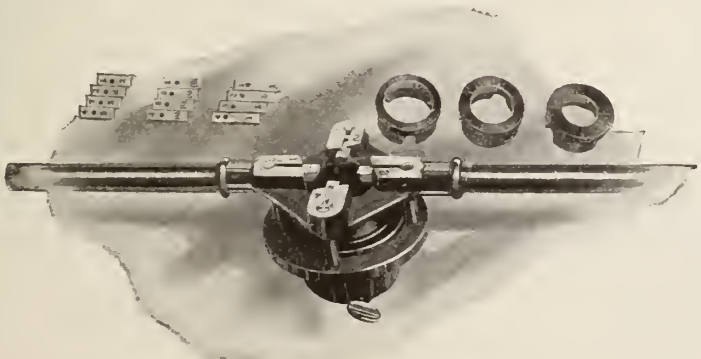

Toledo No. 1 cuts 1 in. to 2 in.

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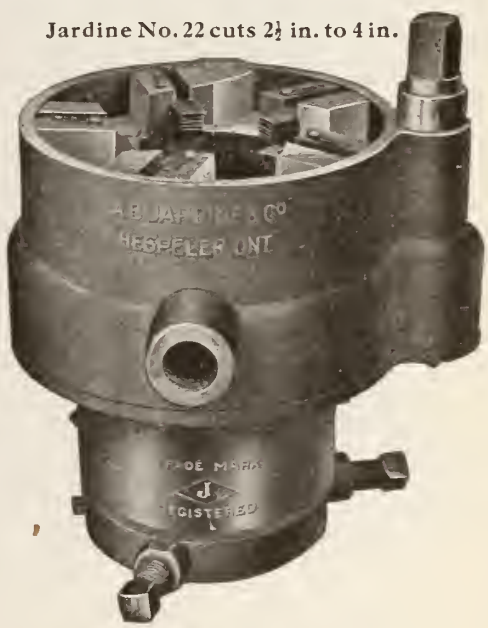

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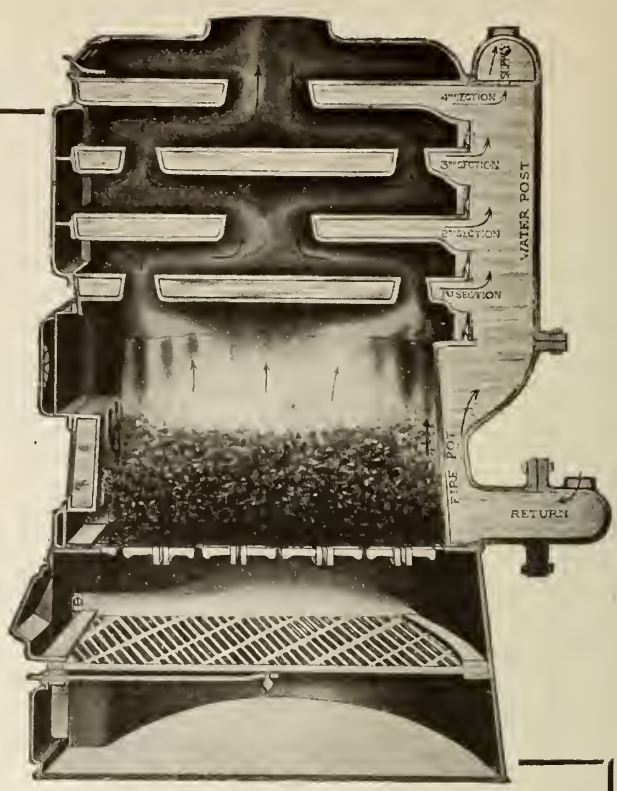

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THE SANITARY ENGINEER

VOL. IX. APRIL 1, 1915 No. 6

A Sanitary City Home

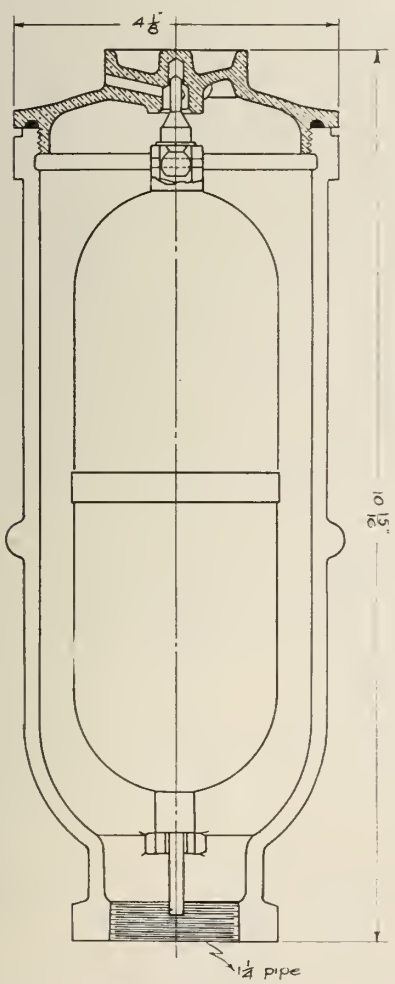
Describing the Sanitary and Heating Equipment in the Residence of T. Fussell, Esq., Oakmount Road, Toronto.

WHILE we often hear it asserted that city people have the advantage of this or that sanitary convenience, we very seldom analyse the statement.

Let us ask ourselves whether there are many really sanitary homes in our towns and cities, that is, as sanitary as they might be.

A residence might have the most modernly equipped bath room and yet be far from sanitary.

For instance, a home may not be properly heated, or there may be poor provision for ventilating every apartment, and not sufficient windows to give ample light. In such cases it could not by any means be called a sanitary home.



Showing interior view of the Dunham Air Eliminator.

Residence of T. Fussell, Esq., Oakmount Road, Toronto.

The Sanitary Engineer visited the residence of T. Fussell, Esq., Oakmount Road, Toronto, recently, and in this article it is proposed to define what one might fairly describe as a sanitary home.

The very best, though not the most expensive bath room fixtures are installed. Hot and cold water is supplied throughout the whole house by a Ruud automatic gas water heater, which furnishes an unlimited quantity of hot water as required. The moment a hot water tap in any part of the house is turned on that moment a supply of hot water is to be had, this heater is situated in the basement of the house.

The basement is every bit as well lighted as any other room in the building, plenty of good sized windows being furnished.

Another very noticeable difference between this residence and most so-called sanitary homes is the conspicuous absence of dust.

To be strong, well, happy and efficient we must be hygienic in our habits. Soap, water and sanitary plumbing are all to be desired, but poisoned air in the home means toxins in the bodies of the occupants—then disease. All disease is unclean.

Sweeping and dusting are very crude, laborious and primitive operations. Distributing the dust and dirt in the air, it settles upon furniture and other household goods and has to be again wiped off by hand only to be breathed into the lungs, which really means that we inhale so many disease germs into our constitutions.

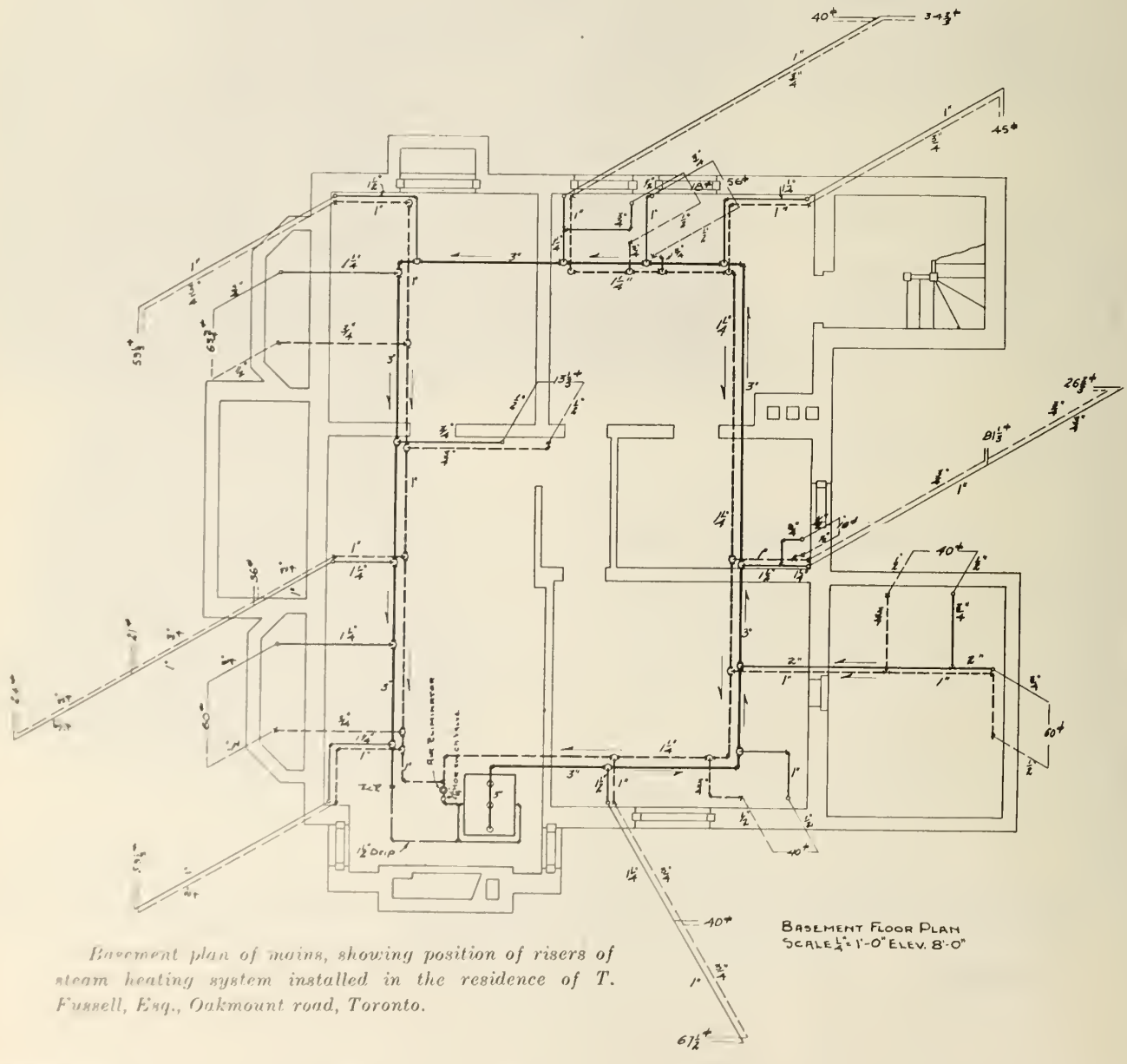
However, the reason why dust was so conspicuous by its absence is that Mr. Fussell has had a TUEC suction cleaner

installed. This machine is situated in the basement. It is electrically driven by a 1-9 h.p. motor, which can be operated by a switch at various points throughout the house.

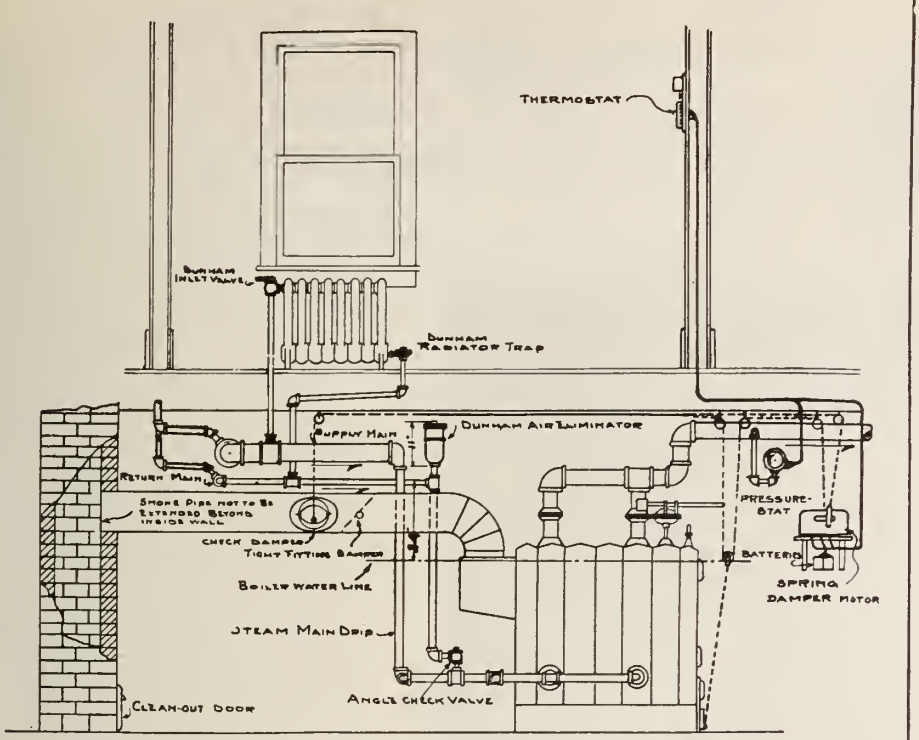
A 2½ inch riser pipe extends from the machine through the central part of the house and is furnished with 2-inch outlets as convenient points. A 30-foot hose length is furnished the fittings of which are arranged so as to make perfect connection to each outlet. The dust is collected into a large tank which is part of the machine. Sanitary engineers would do well to look into the merits of such appliances, because in these days money is demanding more actual service than ever before. The ordinary installation has become a staple quantity upon which profits are cut to nil.

The next subject to take up is the heating. This residence is heated by a low pressure steam system and is controlled by a thermostatic controlling device. The temperature can be regulated to whatever degree of heat is resired. Fig. 1 shows the boiler layout, which is worthy of a little careful study. It is very simple, yet about as effective as it could possibly be. One steam main 3-inch diameter is taken off the top of the boiler, and is carried full size round the ceiling of the basement as shown in piping plan Fig. 2. This main, it will be seen, is not reduced in size as is the common practice, but is kept full size until it reaches the boiler again. It is then reduced to 1½ inches as shown in Fig. 1, and drops down to the bottom and is connected into both sides of the boiler. The return main is shown by dotted lines in Fig. 2. Our readers should notice very carefully how the various connections are made. Let us commence at the boiler. In this case it will be seen that a 1¼ inch horizontal check valve is fitted to the same pipe which drips the steam main, then the return is carried up vertically. A Dunham air eliminator is connected here (see Fig. 1.), under which is fitted a tee. Then one return pipe is run along the ceiling to the front and another to the rear of the house. These are 1¼ inch and 1 inch respectively. All branches to radiators, both steam and returns, are taken off at 45 degrees, and both the piping and boiler is covered with a good quality insulator.

Each radiator is fitted with a Dunham, packless graduated radiator valve on the flow, and on the return is fitted a Dunham steam trap. A typical method of radiator connection is shown in Fig. 2. The whole system was certainly working splendidly at the time of in-



Basement plan of mains, showing position of risers of steam heating system installed in the residence of T. Fussell, Esq., Oakmount road, Toronto.



Elevation plan of boiler and attachments, including pressurestat, spring damper motor, batteries, etc., all controlled by Thermostat controlling appliance, installed in residence of T. Fussell, Esq., Oakmount road, Toronto.

spection. The steam gauge registering exactly two ounces of pressure, one very striking feature was, that because of the mild temperature outside, the radiators were heated at the top portion and became gradually cooler lower down. At the same time, the thermostat and pressurestat were in full control of the whole system. No unsightly air valves are necessary with such a system, because each radiator is under the control of its own individual return trap, while the air is taken care of by the automatic air eliminator.

For the benefit of our readers we have re-produced an enlarged view of the air eliminator, see Fig. 3. Fig. 4 is a view of the residence. The boiler furnishing steam to the system is a 30.6 Viking, manufactured by Messrs. Warden King Co., Ltd., Toronto and Montreal, and Steel and Radiation, Ltd., furnished the radiators, 21 in number, 830 square feet.

In the first portion of this article we stated that the basement was well lighted. In Fig. 4 will be seen three of the basement windows, and on plan Fig. 2, there are shown no less than seven windows. These windows not only provide ample light, but are also a great assistance towards keeping the atmosphere pure. Sunlight is one of the finest purifiers known to scientists.

Toronto Society Monthly Meeting

Edwin Newsome, Editor of The Sanitary Engineer, Gives an Address on Septic Tanks, Followed by an Interesting Discussion.

THE regular monthly meeting of the Toronto Society of Domestic Sanitary and Heating Engineers, held March 25, in the Canadian Foresters' Hall, proved to be one of the most successful meetings held for some time.

There was a large gathering both of members and non-members present, the latter being new applicants for membership.

Mr. Geo. Cooper was chairman of the entertainment committee.

Mr. Edwin Newsome, editor of The Sanitary Engineer, gave an address, illustrated by chalk and blackboard sketches. The subject was septic tanks and sanitary methods of sewage disposal for rural residences. Great interest was shown, as was evidenced by the number of questions asked. Several members gave their experiences with septic tanks, amongst whom were Mr. Geo. Clapperton, of Messrs. Bennett & Wright Co., Ltd.; H. Hicks, president of the Ontario Association; Geo. Cooper, chairman, and Mr. H. Farthing, chairman of the examination committee.

A hearty vote of thanks was tendered to Mr. Newsome for his kindness in coming forward to address the members. Geo. Cooper delivered the vote of thanks, which had been moved by Mr. Geo. Clapperton, and seconded by T. B. Smyth, president of the society.

Mr. Newsome, in replying, stated that it had given him great pleasure to address the members, and that if the others had gained by his address, he too had benefited by listening to the experiences of others. He further urged that the members of the trade send in to "The Sanitary Engineer" any information they had gained upon any subject of interest to the trade, as it was only by the exchanging of one's experiences that the greatest progress in sanitation could be made.

The rest of the evening was devoted to "pleasantries." A game of progressive euchre was played, and two prizes were given. The winners were: First prize (automatic cigar lighter), S. Warburton; second prize (a Tipperary pup), C. B. S. Reed. Master Cooper very ably officiated upon the piano, after which refreshments were served, the members dispersing after having joined in singing the National Anthem.

GALT BRASS SECURES GOVERNMENT CONTRACT.

The Galt Brass Co., Ltd., has been favored by a second order from the Government for brass sockets and plugs to be used in 18-pound shrapnel shells. The first order being turned out in such a creditable manner, quickly brought a repeat order. We are told this company is now working night and day.

Many a merchant deludes himself with the idea that he has the world at his feet, only to have his foot slip.

The man who hates most to take advice is very likely to be the man who most needs it in his business. Good advice is well worthy of careful attention.

Providing for the Damaged Workman

An Explanation of the Workmen's Compensation Act of Ontario

Reprinted from MacLean's Magazine.

By ROBSON BLACK

Based on an interview with Sir William Meredith.

IN the good-old-days when Peter Pennyman, head moulder of the local stove works had a leg and one arm pried off in the machinery the boys took up a collection. And Peter? Peter—he got better. He had no arm, no leg, but the *bon dieu* left him a stomach. So the end of the story was that P. Pennyman, injured moulder, sold bootlaces at the busiest corner of the main street for thirteen years and eleven days and when the time came to die was mourned by a wide circle of police.

Now, John Dermott, pattern-maker, was nephew to Peter Pennyman. Only John's clock struck forty-seven on February 1st, 1915. On February 3rd, during a lull in the pattern shop, John obliged the foreman by lending a hand in piecing a broken belt. No blame to John if a clumsy apprentice dropped a hammer on the belt at the instant of its highest speed. But the crash of shafting and the yell of pain left no doubt who shouldered the penalty. They lifted Dermott into an ambulance with his fourth rib where his third should be. And for a couple of weeks he had lain upon a bed trussed and iodined like the mummy of Pharoah.

On February 6th the Ontario Workmen's Compensation Board received a notification from the employer that J. Dermott, pattern-maker, had been injured. John himself, or his wife, or son, submitted a similar declaration. Forms were quickly filled up by employer, workman and physician. There were a few other details—nothing to frighten anybody—and the postman, one morning, slipped a long, flat envelope down the gullet of the letter-box. It was a cheque for $44, representing 55 per cent. of the pattern-maker's monthly earning capacity. And the cheques came along, and will come along, until John Dermott quits his bed, a cured and happy man.

SIR WILLIAM MEREDITH,
The designer of the Ontario Workmen's Compensation Act.

John may not get better; what then? He will draw the $44 a month until the end of his days, though he live to be ninety-eight—and pensioners seldom quit earlier than that. He may die of his injuries; what of the widow? She will receive $20 a month in perpetuity. If there are children, there is an additional $5 a month for every chick under sixteen years of age, the total pension not to exceed $40 a month. Maybe, Mrs. John may want to marry again. Very well, the new law makes it easy, for she is entitled to a lump sum of $480, representing two-years' payments, within one month after her re-marriage.

There are, of course, other circumstances. Assume that our good man John is only partially incapacitated by his accident. He used to earn $20 weekly; now he earns but $10. In that case, says the Workmen's Compensation Act, he will receive 55 per cent. of the impairment of his normal earning capacity, which means an added $5.50 a week, bringing his total to $15.50.

Without supposing that any more things could happen to John Dermott than partial disability, total disability, and death, the point to emphasize is that unlike his uncle, Mr. Pennyman, he will not be called upon to hawk bootlaces, nor to bring busy housewives to the front door to buy a can of tooth-powder.

The Workmen's Compensation Act is Ontario's one revolution in twenty-five years. There have been other ructions in the jealous old *status quo* but exceedingly few have proved more than chary compromises—*squibs* of reform. In the Legislature of last year the Act was passed. On January 1, 1915, the machinery began its operation. That is, at the present writing, just two months ago. Like most other serious efforts to re-adjust conditions, the process received full accompaniment from the anvil chorus and the celebrated Hands-Off! Trio. But the Act arrived. It is Ontario's permanent guest. Only two months' trial and—what? The Canadian Manufacturers' Association officially advises all members to accept the Act without protest and give it every co-operation in the trust that alleged injustices will be righted by time and experience. The working man has had scarcely time enough to appraise the Act at its full meaning. After all, it is *his* Act, conceived and fashioned in the recognition of conditions affecting the industrial worker. Time will probably show that the compensation law, approximately as it left the hands of its designer, Sir William Ralph Meredith, was as inevitable as public ownership of post offices; and equally bulwarked in public favor. In a twelve-month of operation, the Workmen's Compensation Law of Ontario may come to be so happily regarded that the warnings and mutterings clouding the long days of the inquiry will read like an anthology of spook-craft.

In a suite of rooms at the Normal School Buildings, Toronto, the Workmen's Compensation Board dispenses the new and overflowing measure of industrial justice. Three men, Samuel Price, A. W. Wright, and George A. Kingston are the "judiciary" and while all represent good ability and unexcitable judgment, none can be said to hold a brief for any special class or to be possessed of private fads conflicting with the spirit of the legislation. It would seem as if Sir James Whitney nominated them from the ranks of conscientious laymen rather than as sectional extremists or over-whittled "experts." The machinery implementing the Act is simplicity itself, at the same time being the product of elaborate actuarial preparation and under the guidance of practical masters, such as F. W. Hinsdale, who had large experience with the Washington State law.

THE SCOPE OF THE LAW.

In every working day, from forty to fifty men are injured in Ontario who come within the purview of the new law. Nine hundred cases have been handled in less than a month and a half and this, for various reasons, is much below the average of a similar period as the Act grows older. Five Ontario men, or thereabouts, are killed every week while in their industrial duties and these form another class whose claims must have immediate attention.

Prior to January 1st, none of these men or their dependents had any right in the eyes of the law to recover damages *unless* negligence of the employer could be proved. Were the workman himself guilty of negligence, the way to recovery was absolutely barred—as was equally true when the cause could be traced to the negligence of a fellow workman.

All these legal exceptions aborting the spirit of even the most primitive measure of compensation were unfair and extravagant. In whatever manner a workman is hurt, he is still *hurt*, and his earning capacity either lessened or wholly removed. Whether he is killed by other's negligence or by his own or by nobody's, his widow and children face the same peril of poverty. A designer of less breadth of view than Sir William Meredith—suppose he had been a mere legal technician—would have quailed before the thought of upsetting fifty or a hundred hoary precedents such as glistened from the pages of previous legislation. Fortunately, the commissioner did not make the mistake of draping a new law on the bones of the old; existing statutes he accepted mainly as a horrible example of what should *not* be. What eventually came from the hopper as a Workmen's Compensation Act was fresh and vivid as a wireless flash.

The new law differs from any other that Canada has ever known in the *amount* of compensation. It used to be a lump sum (in the cases lucky enough to get anything) guessed at by judge and jury and handed over to the workman or his dependents. Under the new law, all questions as to right of compensation and the amount are determined by the board of three Government-appointed members, whose verdict shall be absolutely final. No court can repeal it; in fact, *all courts* are superseded. Neither are there any costs to the workman or his employer to ascertain the board's opinion. Whatever moneys are paid are split into periodical sums thus providing for *continual* maintenance independent of an individual's personal extravagance or folly which, under the old system, often frittered away lump sum damages within a few weeks or months.

How does this work out in dollars and cents?

Having received notification from an employer of a man's injury or death by accident (or illness through an "occupational disease" such as lead poisoning) and with confirmatory evidence on hand from the victim or his dependents and the physician in charge, the board loses no time in sifting the facts and apportioning the payment. The presence or absence of negligence in employer or employee may sometimes affect the amount of compensation but can never void the worker's claim altogether. The only cases in which compensation is not payable, provided the accidents arises out of and in the course of the employment are: (1) Where the disability lasts less than seven days; (2) where the accident is attributable solely to the serious and wilful misconduct of the workman and does not result in death or serious disablement.

The board is hedged in its judgments by yet other considerations. Thus, no agreement to forestall the benefits of the Act is valid; no part of the amount payable to the accident fund by the employer is to be charged against the workman; nor can compensation be attached, charged or assigned without the approval of the board.

Geo. A. Kingston, of the Workmen's Compensation Board.

Samuel Price, Chairman of the Workmen's Compensation Board.

THE SCALE OF PAYMENTS.

Once the legitimacy of an employee's claim is admitted—and it requires only a few days—this scale of compensation comes immediately into effect:

If the accident results in death and the workman leave a widow she is entitled to a monthly payment of $20.

If he leave a widow and children, the payment to the widow is $20 a month and $5 a month for each child under sixteen years of age, with a maximum total payment of $40.

If he leaves children only, the payment is $10 a month for each child under sixteen.

If the workman was under twenty-one years of age and his dependents are his parents, or one of them, such dependents shall receive $20 a month until the workman would have been twenty-one years of age. This term of pension may be extended by the board.

All payments are governed, however, by the provision that in no case shall they exceed 55 per cent. of the workman's earnings in the employment. Also, the maximum salary or wages upon which the board is allowed to compute compensation has been placed at two thousand dollars a year.

For the workman who is permanently disabled through his labors, it is provided that he receive 55 per cent. of his wages. That is, if he were earning $25 a week, he must be paid $55 a month with no time limit except the day of death.

Then by abolishing all opportunity or necessity of court actions and making the board of three members supreme, both employer and employee are facilitated in obtaining justice. Quite commonly, the persons most deserving of compensation were in the poorest position to secure it, because the old system specified that when master and servant did not agree on a settlement the remedy was an action at law. Obviously, the best man at the game of law is the man with a fat purse. Indeed, the "lessons" taught injured workmen and their dependents in obtaining justice through batteries of solicitors and costly appeals became in time a warning rather than an invitation. Then, too, the employer frequently suffered from unfair suits which he preferred to compromise rather than go to the expense of contesting. There is no room for doubt, however, that the law courts as a clearing house of workmen's claims were *in effect* playing into the hands of the well-to-do employer.

Who are included in the operations of the Act?

Not all, but a very large number of the employments existing in Ontario. Exclusions have been allowed and for valid reasons. Thus the retail and wholesale mercantile businesses, farm laborers and menial servants, hotel keeping and restaurant keeping, the business of an architect—the list of excluded employments

A. W. Wright, Vice-President of the Workmen's Compensation Board.

is a long one and the above are merely samples. Where less than six workmen are employed, mining, cheese, butter-making, power laundries, and quite a number of others are spared from the privileges of the Act and where less than four workmen are employed, as in machine shops, repair shops, cabinet work, etc., the industries are regarded as "out of bounds." The object in making these exceptions was because of the relatively small hazard involved and the impossibility in the early stages of administration to collect names and make assessments. As time goes on, it is not improbable that fresh classifications will be added to those already recognized.

All employments upon which the workmen's compensation measure exerts any influence, are divided into two general classes. Those who are liable to contribute to the accident fund constitute the more important group as regards numbers, including lumbering, pulp and paper mills, mining, quarries, iron, steel and metal foundries, agricultural implement works, chemical plants, distilleries, and a great variety of others. There is a second class, called Schedule 2, which the commissioner specified as *individually* liable to pay the compensation and who, therefore, do not contribute to the accident fund. This includes enterprises carried on by municipal governments, public utilities commissions, the operation of railways, the operation of a railway company's car shops or similar plants, the business of an express company. Construction work on railways is also included when such is carried on by the same parties which operate the finished system. What happens in case of accident to an employee in this second class is that the board establishes the amount of compensation and assessment is made upon the employer direct. As far as the workmen's interests are concerned, either classification assures him immediate and generous treatment.

THE EXCLUDED LIST.

But there are workmen excluded from *both* sections, but still forming a substantial total. What of their position? It has been one of the finest testimonies to the thoroughness of Sir William Meredith's inquiry that these temporary "outlanders" are placed in an improved position. Had one of these men been injured in December last and had he entered suit for redress, very likely the courts would have listened to grave debates on "assumed risk" and "common employment"—meaning, "you took the risk when you took the job." Had his accident occurred one month later, with the new law in force, he would have found that, while he was obliged still to appeal to the ordinary courts for damages, there was no longer any validity to the employers' defences of "assumed risk" and "common employment"; and "contributory negligence" ceased to be a bar to recovery. Even from this clause, however, the farm laborer, the domestic servant and most clerks continue to be excepted.

HOW THE BOARD WORKS.

The actuarial machinery of the Workmen's Compensation Board would be in itself the subject of an interesting description, but in an article of a summarizing nature, it may be used to answer two or three more obvious questions.

Who supplies the money for the compensation?

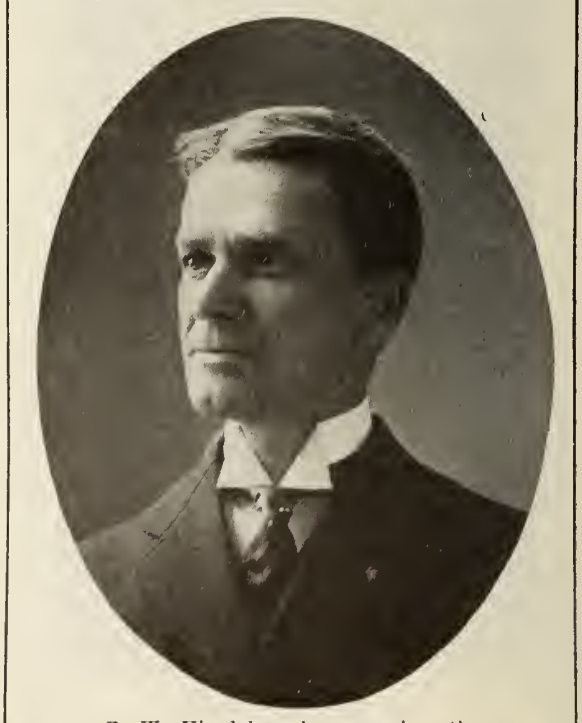
The funds from which all payments to workmen or their dependents are derived represent, in the main, the contributions of employers. The workmen contribute nothing—in cash. The province provided for $100,000 a year and undertook to pay for the maintenance of the governing board.

All industries are *grouped* and assessments are made upon the basis of the annual payroll; this is a rough and ready method and serves the purpose satisfactorily. As an illustration, the pulp and paper mills present a fairly uniform hazard for their workers. The paper-making machines and the pulp grinders are pretty much alike in the mills whether at Thorold or Espanola. The employers in this line of manufacture are hence more willing to pay their share of indemnities for accidents than if they had been "unevenly yoked" to canning factories, and car shops which bear perhaps different hazards and certainly could not easily combine with them for reducing risks.

Since the bulk of the funds distributed by the Act comes from the employers, one may speculate as he pleases in regard to the *ultimate* derivation of the money. Upon that point, Sir William Meredith does not try to mince his convictions. "The burden which the workman is required to bear," said he, "he cannot shift upon the shoulders of anyone else, but the employer may and no doubt will shift his burden upon the shoulders of the community, or, if he has any difficulty in doing that, he may, by reducing the wages of his workmen, compel them to bear part of it."

Upon what assumption were the rates established?

The Ontario law being a new and untried measure, and as the hazard of like employment differs sometimes greatly in a Canadian province and an American state the only solution was to strike an average between the state-operated rates of the American republic and the rates charged by liability companies hitherto in Canada. Other factors also had an influence. When the general manager of an agricultural implement works received an account for .80 per cent. of his 1915 payroll as due to the treasury of the Workmen's Compensation Board, it means that the .80 is *estimated* on all available means of judgment as his share of the total of compensation awards in that particular industry during 1915. Maybe the rate will have to be increased or lowered for 1916 but that will be decided by the results of the current twelve-month. One point on which there may be implicit reliance is that all payments made to the Compensation Board go into the pockets of injured workmen, or dependents of de-



F. W. Hinsdale, who supervises the machinery of the Act.

ceased workmen and are not deflected for any other purpose.

When the Ontario rates get down to rock bottom, as accident experience will soon determine, it will probably be found that nowhere in America or Europe are the costs so well and easily distributed or the benefits so advantageously applied.

To the citizen inured to the old-fashioned conception of an employer's responsibility (or lack of it) for his employee's safety and welfare, an Act so sweeping as to wipe out all the old legal defences and place every injured creature on a generous allowance and his widow and children on a pension, must seem the veriest dare-deviltry. Yet the same person must concede that, if a workman is *ever* entitled to recovery for injury, it would be best to avoid the courts and save the amount of damages from dissipation. When Sir William Meredith goes beyond this and establishes the right of practically all workmen to continual support from the employers' fund no matter whose the negligence, he takes the ground that *Industry* and not soup kitchens must look after the helpless humans sacrificed in the service of industry. To the yawning criticism that workers surrounded by such pleasant options will not maintain their usual safeguards, the retort of experience is that no worker in his sane senses deliberately invites a painful, perhaps fatal bodily hurt *for the reward of lowering his weekly wage by* 45 *per cent.*

"It is contended," said Sir William Meredith in discussing this very point, "that it is unfair to require the employer to pay compensation during the lifetime of the workman because in many cases it will mean that the workman will receive compensation for a period during which if he had not been injured he would have been unable to earn wages. No doubt that will be the result in some cases, but on the other hand the workman loses any advantage he would have derived had he not been injured from an increase in his wages owing to an improvement in his position, or to an increase in his earning power."

The three states of the American Union which have state-administered workmen's compensation funds, Washington, Oregon and Ohio—not to mention Germany, to which the Ontario law is closely related—have very little desire to seriously amend their present forms of law. So reasonable and well-considered do these laws appear that organizations like the Ohio Manufacturers' Association and other bodies of similar standing recently gave the state-administered compensation act their hearty endorsation. There are other states in the Union which have ventured into the same field but probably in no instance can there be found a measure so courageous and complete as that which stands on the statute books of Ontario at the moment. It bends unduly neither to employer nor employee and displays a somewhat amazing facility for winnowing truth from half-truth and separating main roads from blind alleys. New York state, for instance, tried to tailor itself a workmen's compensation law. The result is that New York state's table of rates is only a trifle below that of the liability companies, the consequence of which is that the companies retain the bulk of the business. Where in Ontario the percentage of the pay-roll for pulp and paper mills, for instance, is $1.40, the New York rate is $4. Car shops in Ontario pay $1.20 and in New York state $4.50. Operation of packing houses in Ontario is rated at $1.50 and in New York state at $6.50; these instances are multiplied wherever in the two lists one chooses to make comparison.

If one desires to know the ideals which inspired the architect of this most important contribution to the social and economic progress of Ontario, probably in all the days of its history, that architect's own words may give away the secret:

"In these days of social and industrial unrest it is, in my judgment, of the gravest importance to the community that every proved injustice to any section or class resulting from bad or unfair laws should be promptly removed by the enactment of remedial legislation and I do not doubt that the country whose Legislature is quick to discern and prompt to remove injustice will enjoy, and that deservedly, the blessing of industrial peace and freedom from social unrest. Half measures which mitigate but do not remove injustice are, in my judgment, to be avoided. *It would be the gravest mistake if questions were to be determined not by a consideration of what is just to the workingman, but of what is the least he can be put off with.*"

SCALE OF COMPENSATION.

If the accident results in death and the workman leaves a widow but no children, the widow is entitled to a monthly payment of $20 *a month.*

If he leaves a widow and children the payment to the widow is $20 *a month and* $5 *a month for each child under* 16 *years of age, not exceeding* $40 *in all.*

If he leaves children only, the payment is $10 *a month for each child under* 16, *not exceeding* $40 *in all.*

If the workman was under 21 *years of age and his dependents are his parents or one of them, such parents or parent will be entitled to* $20 *a month until the workman would have become* 21 *years of age, or for such longer time as the Board may determine.*

In the case of other dependents they are entitled to a sum reasonable and proportionate to the pecuniary loss occasioned to them by the workman's death, as determined by the Board.

The necessary expenses of burial $75, *are also in all cases to be paid.*

All the above is governed, however, by the provision that in no case is the compensation to exceed 55% *of the workman's earnings in the employment; and all provisions for compensation are subject to the proviso that no salary or wages of a workman shall be reckoned at more than* $2,000 *a year.*

In the case of a widow who marries again the periodical payment ceases on her marriage, but she is entitled within a month after her marriage to a lump sum equal to two years' payments.

Where the accident results in total disability of the workman, he is entitled during the continuance of the disability, whether for life or temporarily, to a weekly or monthly payment equal to 55% *of his earnings in the employment. Where the workman is only partially disabled he is entitled to* 55% *of the impairment of his earning capacity.*

THE SANITARY ENGINEER.

The modern sanitary engineer
Drinks neither whiskey, gin or beer.
He does his work up quick and slick,
Gives reasons none for growl or kick.
He is not like the old-time plumber,
Who often was an awful bummer.
He does not try to scamp his work.
Even the helper does not shirk.
Going to work he does not lag,
He has a full kit in the bag.
No tools forgotten at the shop,
Such schemes have all come to a stop.
His work is hard, but with a smile,
He answers questions without guile.
And this is true, for all his skill,
He's reasonable in his bill.
In fact, he is a model man.
Beat him, you knockers, if you can.

James E. Noble,
Toronto.

BACKBONE.

Backbone is the courage of your convictions; confidence born of positive knowledge of conditions.

The stiffening of the fibres of your business sense; the clarification of your gray matter; the realization for all time that honesty is the best policy.

That's what backbone is, and it will be yours, as the day follows the night, if you "get together" in your own city, and "get busy" finding out where you have been wilfully ignorant or heedless, or careless of your store and your sociability.—Playthings.

HOW GOODS ARE MADE IN CANADA

The First of a Series of Articles Which is Being Specially Written For Our Readers With a View of Showing Them How the Goods Which They Buy are Made, a Real Lesson Describing What Made in Canada Means.

The Photos in this Article are by the courtesy of The National Equipment Co., Ltd., Toronto.

ONE of the first things expected of a salesman is that he be able to explain all the whys and wherefores and the special features in the goods he has for sale. To do this, he must know his wares; he must be able to explain the various points which go to make up the features which he may wish to claim for the line he is selling. His customer may ask him all manner of things, and if not well posted, the salesman cannot, to any appreciable degree, succeed.

This article is intended to take our readers through the various departments which are necessary in the make-up of all pneumatic water systems. It is the evolution of the pneumatic water systems that has made it possible for country homes to be equipped with all manner of sanitary conveniences, just as the city home. No city would ever dream of allowing the installation of any kind of plumbing unless there was first, a good supply of water and efficient means of conveying that water to the plumbing fixtures. Those who reside in country places where there are no waterworks are simply buying a private waterworks for themselves when they buy and install a pneumatic water system in their homes.

No sanitary fixture, w.c., bath, lavatory, sink, etc., can be properly installed unless it is connected up to some efficient and reliable water system, and it is an indispensable fact that the pneumatic water system is the only one worthy of serious consideration. Therefore, the salesman should know all he possibly can if he wishes to succeed in the selling and installing of "city conveniences," the most important part of which is the pneumatic water system.

To be efficient in every way these systems must first of all be simple in construction, and no one part is more important than the other. For instance, a first-class pump, be it however good, is just so much scrap if the tank is unreliable and vice versa. The pump must be simple; it must be made as fool-proof as possible.

EDITOR'S NOTE.

If there is one thing which the average sanitary and heating engineer lacks more than another it is the science of salesmanship. One proof of this is that while so many of them have labored for years, they have not by any means acquired the wealth that men in other lines have.

To be a successful salesman one must have a thorough practical knowledge of the goods he sells, how they are made, and why they are good value for money. "All coons look alike to me," says the Darky Songster, and most hose bibbs look alike, but they're not. The sanitary engineer should and will know more if he reads these articles through very carefully.

The Foundry.

The metals which are used must conform to a special analysis. Do not think that a cast iron pump is simply "cast iron." No; a special mixture is very essential, and the foundryman wishing to turn out good castings, such as are suitable for pumping machinery, must know what properties are required in his metal.

In order to get a good casting for this purpose, the iron used should conform to the following requirements:

Show gray fracture.
Be easily worked by tools.
Fill the mould to the thinnest parts.
Chill with a very smooth surface.
Be free from blow-holes.
Have moderate strength.
Show little shrinkage.

An iron with the following constituents would fill these conditions:

Carbon, 3½ per cent.
Silicon, 1½ to 2 per cent.
Phosphorus, not over .7 per cent.
Sulphur, a very slight trace.
Manganese, .35 to .70 per cent.

The next requirement is specially constructed moulding boxes or flasks. A view is shown herewith where a quantity of moulds are ready for the molten iron to be poured into them. The tempering of the moulding sand plays an important part in foundry work. If the sand is too dry, it will "wash," thus spoiling the casting when pouring the hot metal. If too wet, even though very slightly so, the metal is apt to either blow or chill, and if the latter, it is almost an impossibility to machine the casting. Thus it will be seen that good moulding, good iron and expensive equipment are necessary to turn out such castings as are necessary to make good pumps. Not only must great care be taken with the iron castings, but brass castings, too, play a very important part. These must contain a high percentage of copper and tin, and to make the parts non-corrosive as well as wear for an almost indefinite period there must be added about 1 per cent. manganese.

About as good a formula for such brass work is:

Casting copper, 89 per cent.
Pure tin, 10 per cent.

Manganese, 1 per cent.

Such an alloy is not only the very best for such purposes, but is also suitable to machine up.

The Machine Shop.

We will now take our readers into the machine shop, Fig. 2.

At the left-hand corner will be seen a quantity of peerless automatic switches. Towards the centre, on the floor, is a pile of castings as they have been brought in from the foundry. Behind this pile of castings can be seen a machinist operating a large radial drill. The box-shaped apparatus is a special jig, into which the cylinders are placed. This jig is constructed in such a way as to be able to perform every operation necessary to assure accurate alignment to within the 500th part of an inch, thus making it possible to replace any portion in duplicate without any further fitting or adjusting. Fig. 3 shows an enlarged view of this jig which plays such an important part.

Fig. 1.—Ready for a cast, one of the first steps necessary in the manufacture of pneumatic water systems.

A quantity of wheels is shown in the rough. These, too, must be very accurate; and to ensure this accuracy another form of jig is brought into operation. It is something after the style of a chuck, with special spring clutches attached. These wheels are machine grooved, centred, bored and balanced before they are taken out of the lathe, and if ten times their value were paid for them they could not be more accurate.

This portion of the shop shows that it

Fig. 2.—Machine shop, castings on the rough from the foundry are turned, milled, boxed and otherwise completed.

requires the following machinery to turn out one single pump:—Large radial drill, turret lathe, engine lathe, planer, friction drill, large and small grinders and a hundred-and-one small and large jigs.

The next step towards the completion of a pump is the fitting up and testing. Any part which shows the slightest inaccuracy is at once thrown out, because,

Fig. 3.—Jig which holds the pump in true alignment; a pump cylinder being bored.

as we stated before, each and every part must fit, so that it may be easily duplicated. It will be readily seen that if, when fitting up, any readjustments had to be made these adjustments would cause trouble later on.

Fig. 6.—Rolling Mill. Every plate of steel must be curved gradually and in perfect alignment, so that the rivet holes will meet without straining the plates.

The Paint Shop.

After the pumps have been thoroughly tested, they must be painted. Little more can be said of this department. Fig. 4 shows the paint shop.

Shipping Room.

The next step brings us into the shipping room (Fig. 5). In this room the electric motors are mounted and the complete pump is crated.

In the foreground is shown a large number of hand pumps and handles. Next, on the left, is shown a lot of electric worm-gear driven pumps for large-sized water systems, and to the right is shown another style of electrically-driven pump. To the extreme right a man is seen in the act of mounting a motor.

One cannot fail to be impressed with the great amount of detail which goes into the manufacture of pneumatic water systems, for the simple reason that the manufacturer realizes that when one of these pumps is sent out it must be as near perfect as possible. It may be going thousands of miles away from the factory and miles away from any source of supplies. Then, too, when such a system is finally installed, every other part of the plumbing equipment is dependent upon the pneumatic water system.

Fig. 7.—Forming heads for pneumatic water systems showing a head being formed.

The Pneumatic Tank.

While it is necessary to take every precaution known to ensure an efficient pump, one that will stand a lot of wear and tear, it is also very important to choose a good line of tanks.

We have heard of sanitary engineers who have thought that they could save money by buying a pump cheap somewhere and getting a boilermaker to make a pneumatic tank. This has been done very often, only to find that the tank would not hold the air. There is quite a difference between making a pneumatic tank and a boiler. The latter is tested generally to 200 lbs. water pressure per square inch and passed. But this test would not by any means be sufficient test for a pneumatic tank: It has often been found that one of these tanks would be perfectly tight and as dry as a bone under a 200-lb. hydraulic test, and would not hold an air pressure of 125 lbs. per square inch more than five or ten minutes.

The first operation in the manufacture of one of these tanks is the sizing, marking the holes, and then forming. Fig. 6 shows one of the actual sheets which is being formed for the tank shown in Fig. 8.

Fig. 8.—Pneumatic tanks are made in sizes ranging from 140 to 20,000 gallons. The capacity of this tank is 6,000 gallons; it is 7 feet wide and 16 feet long.

The machine is set so as to form the sheet into a perfect circle so that the holes, which have been previously punched will all meet without the slightest strain.

(Continued on page 31.)

Fig. 4.—Painting room. Before coming to this department every pump is subjected to a very severe test.

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J. G. Lorriman, - - - *Manager*
Edwin Newsome, - - - *Editor*

Circulating amongst Sanitary, Heating and Ventilating Engineers, Gas Fitters, Sanitary Inspectors, City Engineers, Boards of Health Architects, etc.

TORONTO, APRIL 1, 1915

Practical Sanitary Science

THE above is the title of a course on practical sanitary science. It is being specially written for the readers of The Sanitary Engineer. We strongly recommend this course to each and every reader because we know it will be of great value to all, particularly to those whose education has been limited.

Dr. Mackay, the principal of the Toronto Technical School, once said that he was astounded at the progress which the plumbers and steamfitters had made, considering the limited education 90 per cent. of them had had.

This is true in every sense of the word, and those who have plodded on and surmounted all kinds of difficulties in their daily struggle know how largely these difficulties have been due to the educational culture they so sadly lacked.

This course is published for the sole purpose of making things easier for all, and we sincerely hope that our readers will get all the benefit out of it that they can.

If, from time to time, there happen to be questions upon which any of our readers are not quite clear, we shall be only too pleased to reply to any inquirer upon being furnished with name and address.

Further we propose to hold these articles in type for a certain period so that any new subscribers who desire to begin the course may do so.

It is the first time in the history of the trade in Canada that such a sanitary science course has ever appeared in any Canadian paper interested in the sanitary and heating business, and we, therefore, again urge each and every reader to take advantage of this splendid opportunity of increasing his scientific knowledge in sanitary science.

A Question of Overhead Expenses

THERE are many sanitary and heating engineers who boast of the amount of business done per year, and if pressed for an explanation will tell you that their overhead expense is so low that naturally they are nearly always the successful bidders. There is one thing they invariably omit to mention, and that is profits. This is quite natural, as usually there are no profits. How can there be a profit on a lot of cheap work that, apparently, costs very little to take care of in the way of overhead expense? When the overhead expense of any business is too low (meaning by too low, below the average accepted by successful men in the business), there is something radically wrong, and a close investigation will usually reveal that the sanitary and heating engineer has taken "too much business at too low a price."

This excess business is conceded as necessary to a low overhead, but is a low overhead necessary? For instance:

"A," who is out for business and will take anybody's job at any old price, does $30,000 worth of business. At the time of taking accounts he finds that his overhead has been approximately 10 per cent. He finds that his net profits have been $1,000, and that there is due him on finished work $5,000.

"B," who watches credits closely and turns down questionable contracts, etc., and watches every detail in each and every specification, does $15,000 worth of business (one-half the amount "A" did). His overhead is 20 per cent. (twice "A's"). His profits are $2,000 (twice "A's"). Amount due on finished work, $500 (one-tenth of "A's" outstanding accounts). By this comparison it is plain to be seen that "B's" condition is stronger and that his business methods are correct, whereas "A's" statement shows that he is taking "too much business," robbing himself of profits and his neighbors of work that could be turned to a profit for some more conservative man.

Not very long ago we interviewed one of our readers who had employed as high as 40 men almost constantly for 3 years. But it was a question of taking three years to learn a lesson. To-day that man is in actual fact employing 10 men and has a bigger balance at the bank at the end of one year than he had for 3 years' work. This goes to prove that if every job was made to pay its own proportion of overhead expenses and profits, that the cares and worries of the average sanitary and heating engineer would be nil.

The Movies.

QUITE recently there has been a film put on the canvas at some of the moving picture houses which was supposed to be "One on the Plumber," but in actual fact it was and is one on

the public. While some of the scenes depicted could not fail to create roars of laughter the whole production is the height of absurdity.

The film in question showed various doped up pictures which could not even have been enacted for the purpose of reproduction. There is a view showing that the plumber has left his blow torch pointing in the direction of a lead water pipe, and in a few moments the flame from the torch is shown as having melted the pipe, causing the water to gush out, etc. Now a ten-year-old school boy knows well enough that it is an utter impossibility to even burn a paper bag whilst it contains water. Much less a lead pipe.

Such ridiculous films should never be allowed to pass the board of censors, and this latter body should see to it that the film is stopped. If moving picture theatres are allowed to depict such senseless scenes throughout the country, is it any use of the trade trying to clean out the drift wood? It is an injustice to any calling to be made to look foolish and if there were one ounce of consistency in the hearts of our boards of censors no such films would be allowed to exist.

Turned Down New Business

WE have frequently heard of members of the trade taking contracts at a price so low that a profit was almost an impossibility. But until the other day we had never heard of contracts being turned down upon which there was a fair profit absolutely assured.

Such, however, is an actual fact.

A certain specialty firm, heard of a gentleman who, last fall, decided to have a fine house built for himself and family to live in. That is, the house was not being built for speculation. This specialty man interviewed the gentleman and demonstrated his heating specialties in such a way that finally the gentleman decided to have the system installed.

Three heating engineers were asked to tender on the installation as planned and laid out. All these three men began to take turns to show the gentleman that a system *just as good* could be installed for a very much lower figure, providing the special values, etc., were eliminated, and went on to state that such specialties were nothing more nor less than a lot of trash.

Of course the gentleman was won over and the specialty man had to take a back seat. Only one of the men got the job and he lost money on it, because he had to meet the prices of the other two. Now, here's the whole thing in a nutshell: Not one of those three heating men knew anything about this line of specialties. They were the "old-big-size-hot-water-mains," or "one-pipe-steam-job" class, and knew nothing about the special results which could be derived from an up-to-date heating job.

This particular job was a failure this winter and if at all possible will be reconstructed or else torn out, and those three back numbers will be left out in the cold. Here was a chance to make about $50 alone on specialties, yet the opportunity was actually turned down. We would urge our readers very strongly to look into every new line that comes on the market, find out its merits or demerits and be guided by actual tests. Never was there a more opportune time in the history of the trade when the public are buying carefully, and considering quality rather than quantity.

The Coming Ontario Convention

ON another page appear the official announcements regarding the coming Ontario convention. It is to be hoped that all who possibly can will be present. To see a goodly crowd in attendance at such an event proves that the members of the trade are looking into matters and taking note of what is going on in their profession.

The tentative programme is a very attractive one, and several matters of great interest will come up for discussion. One of the most important is that of a proposed new Provincial plumbing by-law. The Workman's Compensation Act as it affects the trade will also receive some little attention. We feel that this compensation bill, while a little crude in places, can and will be materially improved as time goes on, particularly if those who feel they have a grievance will take their case to the commissioner.

No one should take any serious exception to the Act because of the latter, but should rather reason out the week points, and at the same time fully endorse the spirit of the Act.

A very interesting story on this subject appears in another portion of this issue which cannot fail to benefit each and every one who takes the time to read it.

New Kind of Confidence

CONFIDENCE, caution and production are the Canadian business man's essential equipment to face the year 1915. The future is truly uncertain, but whatever comes, no Canadian can afford to forget these three watchwords.

If Canadians lose confidence in their own ability to pilot their well-equipped ship, it cannot be expected that outsiders will continue to exhibit faith in "the land of opportunity." Occasions will arise during the year, says The Financial Post, when confidence in ourselves and our country will win the confidence of British and foreign interests.

But we want a new kind of confidence—not the hilarious and over-optimistic variety which has been in vogue during late years, and which has created weaknesses in our financial position, that now make it additionally hard for us to carry our share of the Empire's burden in days of strife. Rather as a nation we need a cautious confidence—one that will keep us working steadily forward, content even with keeping our heads above water, but never admitting defeat or retreat. The readjustment which started in 1914 will continue in 1915, and the various businesses in the Dominion will go through a sifting process. On account of inherent weaknesses some may fall by the wayside, but this should cause no alarm.

Editorial Briefs

SPRING is here.

* * *

AND SO IS the second annual spring number of The Sanitary Engineer.

* * *

BEGIN TO study the sanitary science course, first article of which appears an another page.

* * *

THE KAISER is getting what he has been working for.

* * *

SO WILL SANITARY engineers, so get busy and do the right and right will prevail.

Let Them Starve! Who?

A Story Based Upon an Actual Interview Between the Sanitary Engineer and a Man on the Street, Showing that Sanitary and Heating Engineers Have a Clear Case When Soliciting Business From Those Who Require Work to be Done.

THERE is an old proverb which says, "Let the shoemaker stick to his last." This is all very well, but it can be carried too far. The layman has to be tutored and taught what the minister understands. And the layman, so far as the sanitary engineer is concerned, knows little or nothing about the practices, usages, customs and costs of the craft and he has to be taught, too. Some people are going about the world in possession of the notion that a sanitary engineer makes a whale of a lot of money. Sanitary engineers themselves would be the first to admit this if it were true: they would like to admit it if they could—but they can't. Of course they are not in the business for their health any more than is the tinker or the tailor or the soldier or the sailor or the candlestick maker, but the idea that the sanitary engineer is a plutocrat or a Member of the Idle Rich Club is entirely erroneous. He is in business to improve the health of his fellow men, and to acquire wealth for himself and those who assist in making sanitary appliances.

The other day we met a man we will call Brown. Mr. Brown and I were chance acquaintances and we soon got talking about business conditions and the like. He asked me how the members of my craft were doing these days. Were they making money? Was there lots of business? Or were things dull for the sanitary engineer?

I told him that with some of us business was fair, but others were doing little or absolutely nothing.

Brown replied that it gave him a great deal of satisfaction to know that the sanitary engineers were at last being starved.

"Starved? Why, what have they done to be starved?"

Says he: "Yes, sir, I was going to have a job done myself about the time that the war broke out, but I decided not to. It's about time those darned fellows were made to suffer. I got a price on the job I am speaking about; it was to cost me $150, and I feel just as if I had done the lobsters out of so much money."

Here is a case of what I am talking about. A man who knows absolutely nothing about sanitary engineering but feels the need of a sanitary engineer now and then is going to have a job done which will cost him $150 and fondly imagines that the whole of that $150 goes into the pocket of his friend the sanitary engineer. The idea of $150 going into the pocket of his friend the sanitary engineer makes the sanitary engineer no longer a friend. Thus by the mere passage of some dollars and the doing of a job by a man equipped so to do, this man changes from a friend into a lobster. Too bad. I took this up with friend Brown right away.

"Do you for one moment think that that $150 you were on the point of investing in plumbing would all go to the sanitary engineer? If you do, Mr. Brown, you are sadly mistaken. Have you ever taken into account the number of different trades that are kept busy when a person like you decides to buy and have installed a modern bathroom?"

At this Mr. Brown looked up.

"For the sake of showing you, friend Brown, we will just consider this matter a little. Let us suppose that a single residence will be equipped with one bathroom, one kitchen and a laundry. Now, according to your ideas, all these things are being installed by men of ill repute and they and they only receive the total benefit derived from you having invested $150 in your house. That is where you are wrong. For the manufacture or ordinary cast iron enamelled baths, lavatories and sinks, the following men will be required:

"Iron moulders, core-makers, grinders, cupola men, enamellers and a score of unskilled laborers of various kinds."

"Gee!" The exclamation came from my friend Mr. Brown. Apparently he was surprised.

"Then soil pipes and fittings require another kind of iron moulder. Then there are grey iron fittings which require to be threaded; the moulding of these fittings also requires another kind of moulder and core-maker; the threading of these fittings is done by machinists or machine operators, most of whom have to be skilled workers. That is one part of the operation."

My friend Brown was metaphorically, if not literally, scratching his head.

"We then turn to the wrought iron pipe. This requires expert workers who are employed in pipe factories and rolling mills. That is another part of the operation.

"The brass goods require, first, brass moulders and core-makers, and these must not be classed with iron moulders. There are moulders and moulders. These brass goods have to be ground, polished, buffed and nickel plated, thus giving work to grinders, brass fitters, machinists and electro-platers.

"If lead is used for the water pipe the services of experts are necessary to draw the pipe. Then comes the range boiler. Apart from the steel, it requires boiler makers, riveters, galvanizers, fitters and so forth to turn out these boilers."

I stopped, a little bit out of breath. My friend Brown was a little bit out of breath too, but not through talking. "So you see, Mr. Brown, the sanitary engineer who is called a lobster is not going to get a whale of a lot out of that $150.

Mr. Brown agreed that he was not. More than that, for Mr. Brown is candid if anything at all, he admitted that his own brother-in-law was a brass moulder and had been employed by a large manufacturer of plumbing goods. Brown further stated that he had had to loan this brother-in-law of his $100 to tide him over the slack time. I went on to point out to my lay friend that **if all those who really required such work done were to get it done, they would be the means of keeping thousands of our most skilled workers employed, comparatively few of whom would be sanitary engineers.**

No man liveth to himself alone. The old Latins used to have a motto, "Non sibi sed omnibus," which elucidated is "Not for oneself but for all." There are a great many people running round like my friend Mr. Brown. When they begin to talk about any trade but their own they are talking, to use a vulgarism, "through their hats." Brown was laboring under a delusion. It was a silly delusion but as soon as we undertook to explain it to him he came round to our way of thinking. And he changed an attitude of antagonism for one of understanding sympathy. There is a good deal of missionary work to be done. It is one way towards the securing of more orders. Take time to let people know that you need the business, and that the sanitary engineer is neither more nor less than a component part of the commercial organism, a cog in the business wheel, which by doing its part makes it possible for the other cogs to do theirs.

(Continued on page 31.)

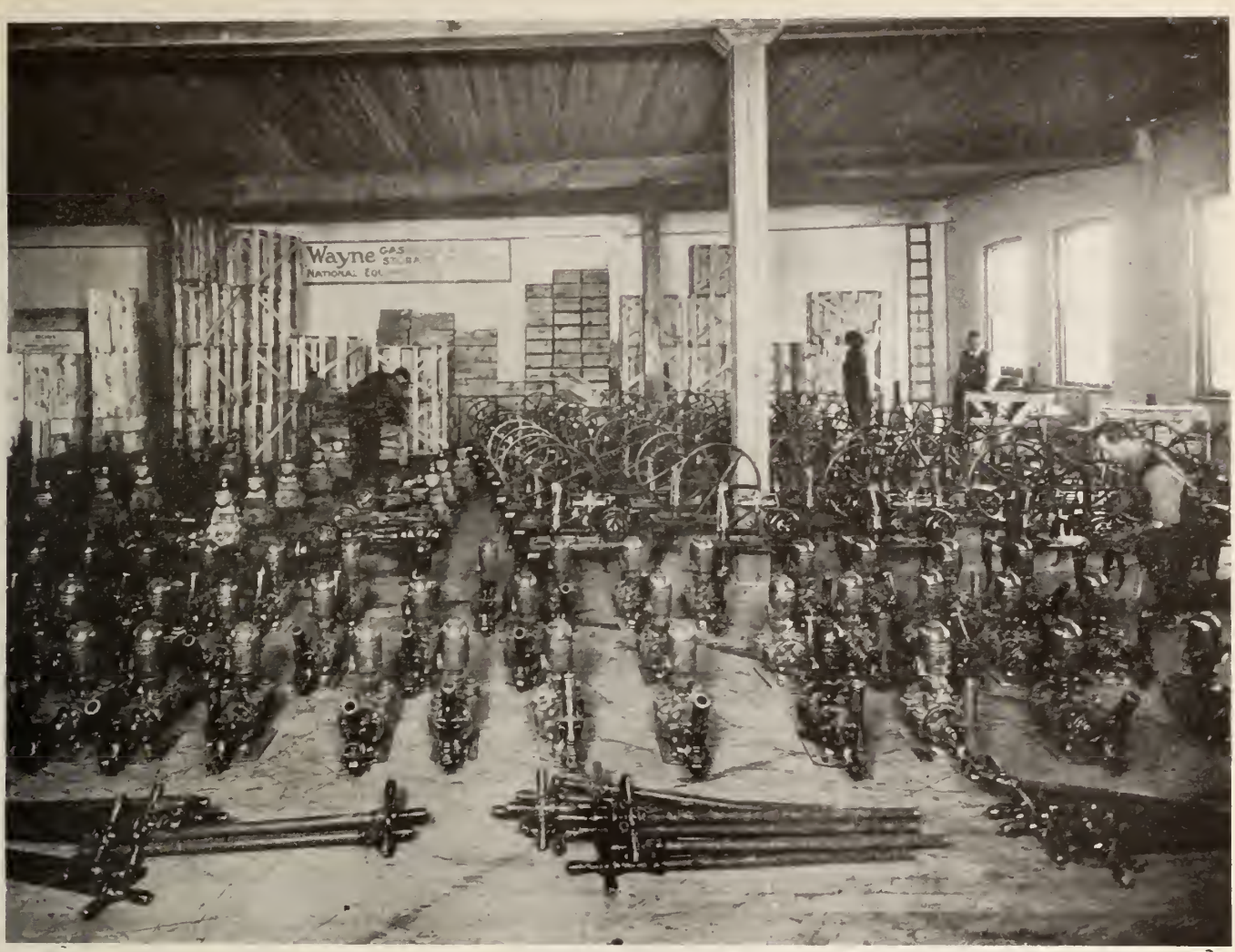


Fig. 5.—Mounting, crating and shipping room. Every pump is shipped complete, a small box accompanying every system in which to pack all small parts.

HOW GOODS ARE MADE IN CANADA.

(Continued from page 27.)

The heads and bottoms must now be raised, this is done by a very powerful machine hammer, a machine which is constructed purposely for this work, see Fig. 7. The heads are made of heavier material and are heated, placed under the hammer, and gradually formed up into the required shape.

The heads now being ready they are trimmed at the edges and the rivet holes are either drilled or punched, the punching being an operation which requires a lot of experience to execute properly, for if every hole does not correspond perfectly with the holes in the body, it would be an utter impossibility to make the tank tight. The two ends are now ready, and the head is first fitted, riveted and caulked on the inside and outside, then the bottom is forced on, riveted, and caulked.

A 200-lb. water test is now put on followed by an air test up to 125 lbs. per square inch. If upon finding that the tank leaks a pail of soap suds and brush are brought into use, every rivet and joint is lathered with the soap and water, and, wherever a leak is detected it is re-caulked, and followed up until the tank will stand for an indefinite period under 125-lb. per sq. inch air pressure.

Size of Tanks.

It may surprise some of our readers to know that tanks for pneumatic water systems, range from a capacity of 140 gallons to as high as 20,000, such are the sizes which can be procured. The tank shown in Fig. 8 is one of a battery of six, which are at present being made up. This tank has a capacity of 6,000 imperial gallons.

Before concluding this article we desire to draw the attention of our readers to the importance of the industries involved in the manufacture of pneumatic water systems in Canada. When you are doing your level best to sell one of these systems, you are doing your part in keeping running Canadian brass and iron foundries which employ brass and moulders, coremakers, patternmakers, etc. In the machine shops devoted to the finishing of machinery, you are assisting to keep at work drillers, borers, planers, grinders, fitters, brass finishers and machinists.

The tanks give work to Canadian boiler makers, cutters, caulkers, riveters and testers, all of whom are the very pink of mechanics.

LET THEM STARVE!—WHO?

(Continued from page 30.)

Here was a concrete example which showed the reason why the business world received such a shock. If we had received the shock with courage and confidence, there need not have been one more man added to the list of unemployed, and business would have been as usual in every sense of the word.

Lots of people are always giving advice who apparently have no use for it themselves.

If you make a mistake that costs the employer money, make it your business to reimburse him if possible in some way—and then avoid making that mistake again.

Getting After New Business

Sanitary and Heating Engineers in Large Towns and Cities are "Seeking" and "Finding" Business—Becoming Better Salesmen Every Day—Quite a Large Number are Realizing an Improvement in Their Business.

Fifth Artiele of this Series.

If ever there was a cloud with a silver lining, there is one at present hovering over the sanitary and heating business. Some are devoting whatever spare time they have to improving their knowledge of their calling; they are studying business methods more to-day than ever. Some there are who, in spite of the conditions partially brought on by the war, are re-constructing and arranging their plants. One sanitary engineer we know of is about to build a showroom and become a merchant. He declared that he knew there was any amount of laws and by-laws in connection with the sanitary engineering business, but to date he had not heard much about profits. "Now," said he, "I intend to share in the good things which are provided by the 'laws and the profits.'"

Speaking to another member of the craft a few days ago, he declared that they were really busy, and upon asking him how he accounted for that, he said: "The reason is, we have done something which we never did before: we have gone after business, we have devoted more time to our showroom, and have changed the position of the fixtures. And, we have begun to advertise, a thing we never dreamed of before the war broke out."

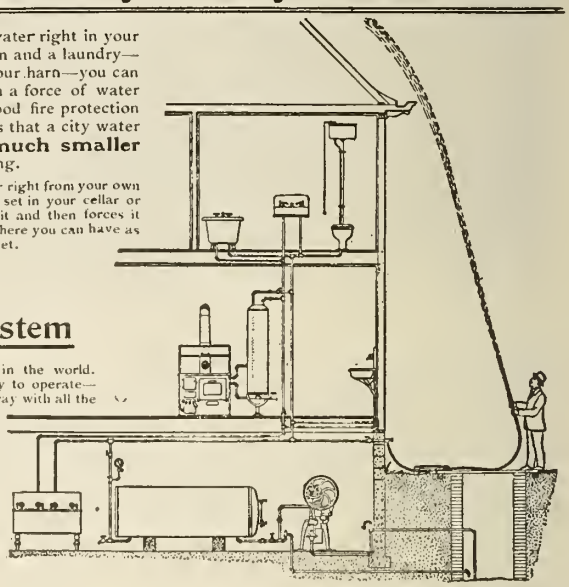
Below is a reproduction of an advertisement which has appeared in a country town newspaper, and has brought results. So much so, that this particular advertiser is doing a fairly good business. Of course it is not only the advertisement which brings the business. For instance, here in this advt there are certain statements made, there are offers of service, and that service must be perfect. It must be reliable, and the work when installed must be the very best. There must be no grievances on the part of the customer which cannot be rectified. The customer must always be right, and in 99 cases out of 100 he is right. It is no use trying to show that a customer is in the wrong; rather strain every nerve in showing that you are interested in the job you are installing for the customer and convey to him or her that you are out to give service first and receive payment after.

In times past the plumber has been scoffed and sneered at, yet he is always in demand, and he has resented the treatment doled out to him. But there is a new day dawning. The plumber of days gone by has also "gone by," and is a thing of the past. In his stead is the sanitary and heating engineer, the professional adviser and mechanic, the man who is turning the polluted communities into health resorts, not in name only, but in actual fact. He is coming into his own; then by all means he should and will respond with an earnest desire to give service, yea, a service which is more to the world than that of any other line or calling. That's the silver lining, readers, get under it.

Don't Move to the City for City Conveniences

You can have hot and cold water right in your own home—you can have a bathroom and a laundry—you can water your stock right in your barn—you can sprinkle your garden and lawn with a force of water strong enough to afford you extra good fire protection—you can have **all** the conveniences that a city water supply system affords—and at a **much smaller cost** than your city friends are paying.

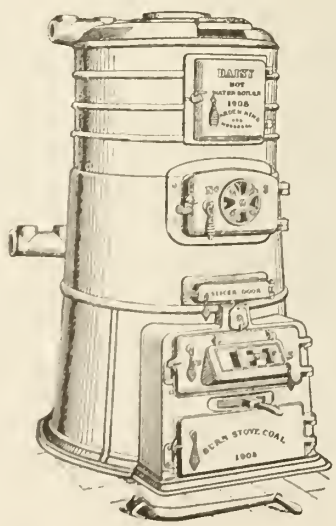
Our system of water supply takes water right from your own well, creek or spring, to a pneumatic tank set in your cellar or buried in the ground, cools and purifies it and then forces it from there to any part of your premises, where you can have as much as you want by merely turning a faucet.



Peerless
Water Service System

is the most perfect water supply system in the world. It's built right and stays right. It's easy to operate—nothing complicated about it. It does away with all the unsanitary and troublesome features of an elevated tank system and costs no more.

We give you the services of our entire engineering department absolutely **free.** We furnish either hand pump, gasoline engine, hot air engine or electric power system, and our expert engineers will tell you just which system will best answer your special case, and they'll tell you how to set it up without making it necessary for you to pay a cent for help.



Summer all the Year Round

By installing a hot-water system in your home you may enjoy all the comforts of a warm house. Easy to handle, easy on fuel, add to value of a home, and easily cleaned. An even temperature is always maintained throughout your building.

Don't delay investigating this permanent investment. A postal card will bring us together. Our experience is yours for the asking.

R. J. SHANNON
Plumbing and Heating Contractor
1233 Queen Street West, - Toronto

LONG DISTANCE TELEPHONE, PARK 243

The original advertisement was 7 x 10 inches and reeently appeared in the local newspaper of a small country town.

"VITRO"

Cluff Manufacturing Co.,

Branch Office and War

TANKS

Beautiful in Design

Handsome in Finish

Over 200,000
now in use

To-day the manufacturers of Vitro Tanks are making and selling more closet tanks than any other individual tank and seat manufacturers in the world. Does not this argue that they must have distinctive merit?

A Vitro Tank once installed, trouble has ceased.

Vitro Tanks are under the scrutiny of experts from the selection of raw material to tested product.

A strictly high-grade Tank at a reasonable price—and one that fills a long-felt want. Jot down a line for circular—it gives full particulars.

THE VITRO NO-TIME-LIMIT GUARANTEE

A new Tank will be given to replace one that at any time proves defective from either material or workmanship.

SOLD BY ALL JOBBERS

Limited, Toronto, Canada

use: Montreal, P. Q.

Sanitary Engineering Only Boy's Work

Remarkable Claims Made—Few Minutes Instruction all That is Necessary to Properly Install Sanitary Fixtures—Advertise Honestly or Not at all, the Public Suffers by Misleading Statements.

TO be informed that a boy can be taught in a few minutes all that it is necessary to know to enable him to install plumbing in his father's home, is certainly something remarkable. To see in print such claims as shown in the advertisement below which hails from Vancouver, is enough to make every self-respecting sanitary engineer quit the business. Such statements are misleading to say the least, and no self-respecting newspaper would even accept such copy if they knew for a fact that such a statement was misleading.

There are a few newspapers will advertise all kinds of "cure alls," but the public are beginning to know that all "quack" medicines are more or less a joke. They have lived their day. But here we are told that a **free demonstration** is given **by a practical man every day in a large demonstrating room.** That **every piece of pipe is laid out before you and every point made so simple,** and a guarantee is given that **a 16-year-old boy can put the plumbing in his father's house.**

You are told to keep your money in the family, by giving your own boy 50 cents for repairing the next toilet out of order, and you are assured that he can do it.

Says the advertisement: "**Send him to us. We sell direct to householders.**

Our system will convince you. Come and see. Money back in every case if you are not satisfied with value received."

Let us just analyse these statements. First of all a practical man is to give free demonstrations.

Demonstrations of what? The rest of the advt. would lead one to think that some practical man is going to demonstrate the works and workings of plumbing, but we venture to assert that no practical man would ever attempt such a task, unless the demonstrator's practicability be very limited, then it would likely not take very long to show any 16-year-old boy all that he, the demonstrator, did know, but this advertisement goes on to claim that after the demonstration any son of 16 summers could install the plumbing of a house. Well, well, such statements certainly render pale by comparison all that ever any "taught by mail" schemers have been known to claim. Some years ago we would hear once in a while that plumbing could be taught by mail in three months. But these schemes did not last long. They killed themselves. We know of several practical correspondence colleges, whose professors will tell you, that if you study hard and put your heart and soul into those hours of study, that they can and will provide you with all kinds of text books and other practical instructions, which will enable you to qualify for certain positions, but here comes along some "practical oracle," who can teach a life's trade in a few minutes. We know what the outcome will be. The public will be deceived, they will buy cheap goods, they will attempt to starve the sanitary and heating engineer, and will succeed just about as well as the German government is succeeding in starving out the population of the United Kingdom.

Free Demonstration

BY A

Practical Mechanic

EVERY DAY IN OUR

Large Demonstrating Room

There each pipe and fitting is laid out before you and every point made so simple that we guarantee a 16-year-old schoolboy can put the plumbing in his father's house.

Keep the money in the family. Give your own boy 50c for repairing the next toilet out of order—he can do it. Send him to us. We sell direct to householders.

Our system will convince you. Come and see. Money back in every case if you are not satisfied with value received.

KYDD BROS. LTD.

'PHONE SEYMOUR 2091. 155 PENDER WEST.

A few months ago a person was summoned before the court in Toronto for installing his own plumbing in his own house. He was not licensed to do such work, he did not take out a permit to do it, and he was fined. Here is an advertiser practically encouraging slipshod work in advocating that boys should install work which in actual fact requires years of experience, before one can undertake it. There are those who have been engaged in the work for 25 or 30 years or more, and the more one learns, the more there still seems to remain to be learned. Therefore, it is foolish of anyone to say that a boy of 16 years of age can be taught to install the plumbing in his father's home. The man is unborn who could learn in so short a time all there is to know in the sanitary and heating business and be practical as well as progressive, and the public should be warned against persons who make such statements in their advertisements. The public of Vancouver certainly have our sympathy if such "practical demonstrators" are allowed full swing.

USE YOUR SPARE TIME.

IF you have any leisure time on your hands do not let it go to waste. How often you have been in conversation with men who seemed just about the average in mentality, yet who surprised you with their knowledge of the details of a certain line of business, or possibly their grasp of certain political arguments on national affairs. You listen more or less in amaze to their arguments on different themes possibly and wonder to yourself where they get their information. There is the whole thing in a nut shell. They are readers. They utilize their spare time in improving their knowledge along certain standard lines or possibly general lines as the case may be. I had a moderately successful business man tell me one time, that he was altogether too busy to read. Reading was alright for those who had nothing to do, but for a business man,—why he could apply himself to his business to a great deal better advantage than to wasting good hours reading current events.

That man never made a greater mistake. He was under the impression that he had made a good success of life.

A Matter of Stationery

The Importance of "Correct Dress" in Business Stationery, Costs a Little More, But is Worth it—A Slovenly Dressed Person Never Created a Good First Impression.

REPRINTED FROM PRINTER AND PUBLISHER.

"YES, I'm planning to start in business early next month, Mr. Campbell, and I've called to borrow from your experience — in other words, to ask you to tell me what are the principal factors, in your opinion, that go to make a successful business career."

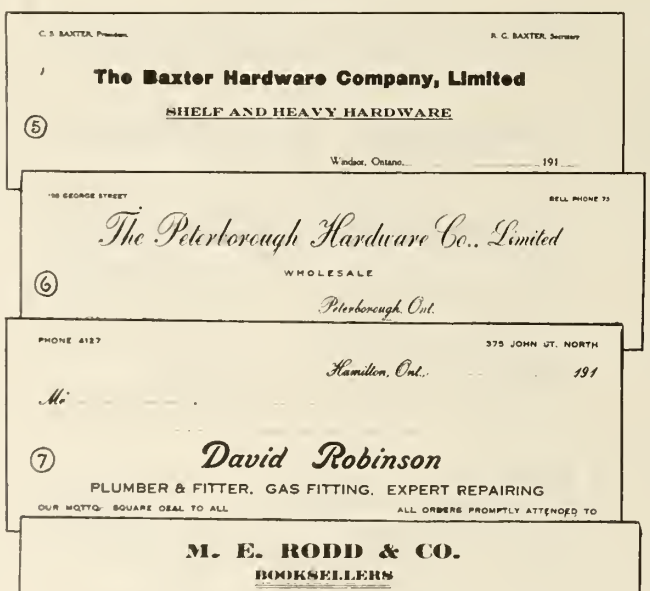
So spoke an ambitious young man, whose name we shall call Wilson, addressing a retailer friend who had been in the general store business for some 15 years. Wilson had been a clerk for nearly as many and had had a good experience behind the counter but was a bit weak on the business end. He spent an hour or more with Campbell and together they went over the ground. Bookkeeping and credit systems, banking and buying, and some other things had been discussed, when Campbell said:

"There's one thing, Charlie, that I was waiting for you to ask about but perhaps I was expecting too much. I recall now that I thought it something of a joke myself when a friend mentioned to me casually, to be sure and use good office stationery. I remember now that I said to him, 'Oh, I guess that wouldn't make or break me,' and immediately proceeded to forget his admonition.

"I'm a good deal clearer on my actual experience with that one office stationery problem during the next four years—the first four of my business career. I worried along with a pad of ruled paper and blue lined envelopes for a while—when our local printer called my attention to the fact and to help the fellow, I gave him an order. Those first letterheads were a curiosity—looked as though they came out of the ark—but I didn't realize it then. Yes, and I kicked about the price too and thought they were dear as a gift yet based on their cost to the printer the price was low enough, for I've learned since that your printing costs very little less to produce than the better kind. Well, as I intimated, my store stationery never caused me a worry for four years, but it was a case of 'where ignorance is bliss.'

"One day the publisher of the Majestic (funny name for a paper, isn't it?) sold out and one of the first things the new man did, after trading off all the ancient type in the office and getting brand new, was to call on me and talk letterheads, billheads, statements, and envelopes. Well, he was a mighty decent chap and we had quite a talk. He showed me a book of samples he had gathered and some of the stationery was that of firms I knew to be very progressive and up to date. The printing was certainly well done, and the paper and envelopes were of good quality also.

"Well, our new friend showed me as clear as day that I'd been making a mistake in being so careless about the looks of my store stationery. The way he put it was convincing. He said the business firm that used good, well-chosen stationery, had a much better chance of gaining favorable attention than the one that didn't bother about such things. 'Why, it's just like a man's clothes,' he said, 'you wouldn't think of going behind the counter with a pair of laborers' overalls on, would you.' I assured him that I was always most particular about my attire when in the store, and liked to see my clerks up to the mark too. 'That's just it,' said he, 'your clerks up to the mark—do you realize that your stationery is the lowest salaried and yet can be made the most productive clerk in your store. It's the best salesman, canvasser, collector and buyer in your employ. Then why not give it a proper suit of clothes?'



"Well, Charlie, I saw the point, and I think from the look in your eye that you do too, but let me tell you the results, or at least some of them that came to my notice. Now remember these are facts, not fiction. First, my stenographer-bookkeeper-general-office-girl spruced up wonderfully. Without a word from me I noticed my letters were more neatly written, properly centred on the paper and so on. Then, too the accounts were gotten out in better shape (we had some new columns added that aided in this) and do you know, she got them out more promptly too. The new order of things seemed to arouse in her a sense of pride in the establishment. Result number two was a pleasing one also. Three of the four principal wholesale houses I did business with congratulated me on my new letterheads and envelopes and there was a tone about their letters that had never been there before. I could see that my new stationery and neater letters won for me a greater degree of respect and prestige than I had ever enjoyed before. My credit with those wholesalers and with others improved remarkably. They all seemed to take it for granted I knew the retailing business better than the average and was entitled to unusual consideration. With my customers too, things improved. So much so that it occurred to me one day that I might as well have my girl get out some personal letters in her spare time drawing attention to special features of our business. I prepared these with great care. So did the stenographer, we got our reward. Those letters produced excellent results and I've been following along similar lines ever since. Make no mistake, Charlie, good office stationery is one of the important fac-

(Continued on page 50.)

THE BAXTER HARDWARE CO., LIMITED

C. S. BAXTER, President — R. G. BAXTER, Secretary

SHELF AND HEAVY
HARDWARE

WINDSOR, ONT.

[EXAMPLE 5]

The Peterborough Hardware Co., Limited

190 GEORGE ST. — Wholesale — BELL PHONE 75

Peterborough, Ont.

[EXAMPLE 6]

DAVID ROBINSON

Plumber and Fitter, Gas Fitter, Expert Repairing

Our Motto: "Square Deal to All." All Orders Promptly Attended To. Telephone 4127.

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HAMILTON, ONT.

[EXAMPLE 7]

M. E. RODD & CO.

Booksellers

STATIONERS AND CHINA DEALERS
KODAKS AND SUPPLIES

Amherst, N.S.

[EXAMPLE 8]

Annual Inspection Essential

The Annual Inspection of all Plumbing Construction is Very Essential — Will Protect the Public From Incompetent Men Who Are Posing as Sanitary and Heating Engineers.

IN March 1st issue of The Sanitary Engineer we published an article entitled "False Economy." We pointed out the need for regular inspection of plumbing, etc. This article has received quite a lot of attention, several daily newspapers have reprinted it, and have been supplied with the cuts which accompanied the article. We have also received several letters commenting upon it and a number of members of the trade have furnished us with drawings of work which is being installed by irresponsible men all over this Dominion. One of our readers took us to task for recommending that a bond be furnished before any person be granted a license or permitted to carry on the busines of sanitary and heating engineers. This reader stated that if every person were made to furnish such a bond, there would be very few in the trade, etc., he cited it as being a hardship.

Well now, all we have to say as a reply to such criticism is this:—

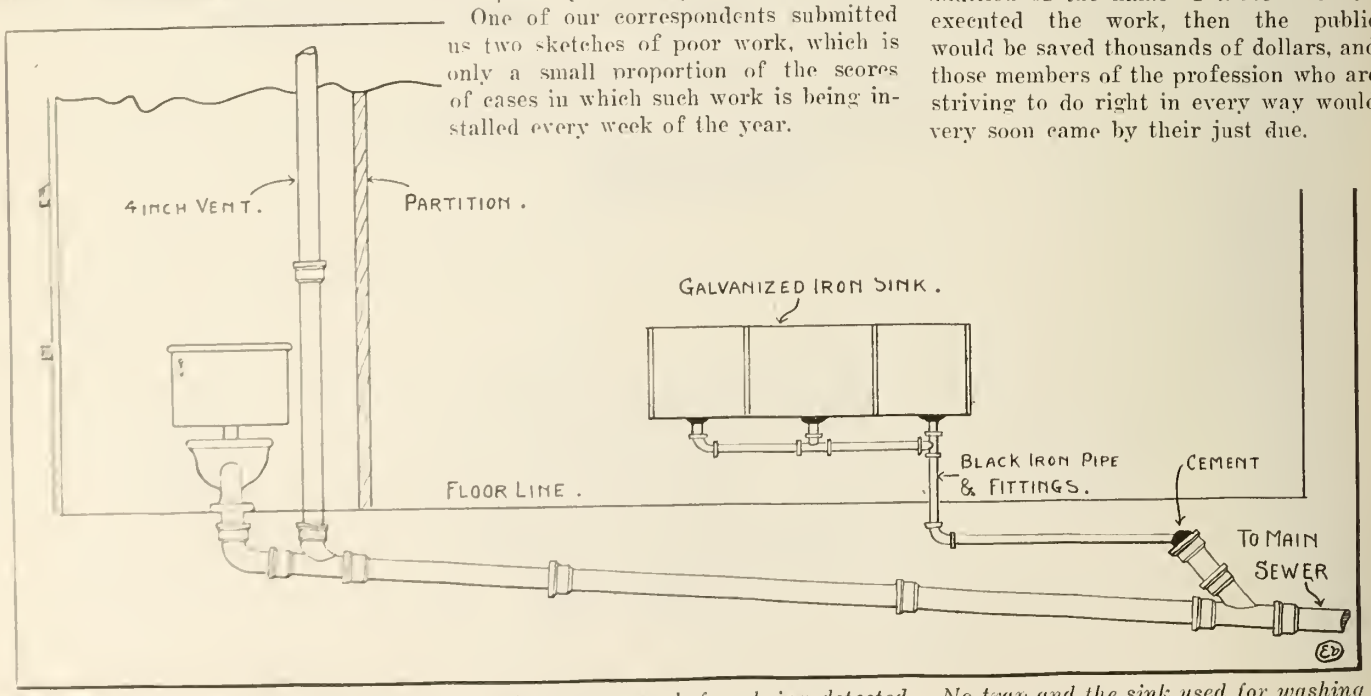
Any person wishing to engage in the business of sanitary and heating engineering who has not friends who know him, and have sufficient confidence in him to warrant their signing a bond, which, while a very legal document, is merely a warranty that the one for whom the bond is furnished is a fit person to engage in the business and that no advantage will be taken of his customers by installing poor work—any such person, we say, is not entitled to a license. The public would be better off without the services of those who cannot be relied upon not to take advantage of their customers by installing inferior work and material.

Here are the facts in plain language: A person wishes to have a certain amount of work done, and calls in Jones and Brown. Jones is one of those men who are in the business for every dollar there is in it, and handles only the poorest line of goods. He sends in his tender. Brown is a man whose heart is in his work. He installs only the very best quality goods, employs the best mechanics, and does all that lays in his power to give his customers good value, but when Brown's and Jones' tenders are compared, Jones is the lowest and of course gets the preference.

The customer cannot in all fairness be blamed for taking the lowest tender. He is not expected to know that the lowest tender is in reality the highest. Time only can tell which installation would be the best value. It is only by using stern measures that the sanitary and heating engineering business can be cleared of the riff-raff who are at present at large doing work in any old way they can possibly get away with.

One of our correspondents submitted us two sketches of poor work, which is only a small proportion of the scores of cases in which such work is being installed every week of the year.

One sketch submitted is described as a bank building. In the first instance the plumbing was installed in accordance with the by-law of the city, tested and passed by the inspector in the regular way. Soon afterwards a sink was needed, and one of these would-be sanitary engineers was called in to do the work. The sink was installed in the basement by simply running the waste pipe without trap from the sink straight down to below the floor, then horizontally for about 10 or 12 feet and connecting into the catch basin trap. The other sketch we show below. This is a building which in the first place was used as an office in the centre of the city. During the middle of 1913 it was converted into an ice cream parlor and quick lunch counter. The receptacle called a galvanized iron sink was installed as shown. Such an installation would be impossible if all sanitary engineering were inspected every year, and if a bond were furnished, and every installation bore the name of the party who installed it. No doubt if a few of these regulations were put in force such as the annual inspection of all plumbing, the keeping of a record of the fixtures installed, the examination of all sanitary engineers before the issue of a license, and the affixing to every installation, alteration or addition of the name of those who had executed the work, then the public would be saved thousands of dollars, and those members of the profession who are striving to do right in every way would very soon came by their just due.



Sink installed after inspection, and in use for two years before being detected. No trap and the sink used for washing utensils which food is eaten from.

Simplified Sanitary Engineering Methods

Being a General Discussion Upon Previous Articles Which Have Recently Appeared in The Sanitary Engineer, Showing How Plumbing Can be Further Simplified at This Date.

ONE of the first and foremost features to be considered when working out a method of simplified plumbing, is that no trap of any description should be placed where it cannot be easily got at for the purpose of cleaning out.

The bath is the only fixture which at this date requires its trap to be placed under the floor and there are a few traps on the market which can be placed on the top of the floor.

Some of these traps too should not be allowed because of the small quantity of seal, and their rough interior.

Such a matter could easily be improved by raising the bath about 1½ inches more than at present. This 1½ inch more height would be more convenient for those who have to clean under it.

The next thing we should try to get away from is the idea of "self cleaning traps." The trap is not made which can claim to be self-cleansing under all conditions. Therefore, what is most necessary is a little more education on the part of every householder, which would prove to him the universal necessity of systematically cleaning all traps.

It is enough to make one feel indignant to see that poor apology which is attached to most drawn lead traps, as well as brass traps, and called a cleanout screw. These screws, caps, plugs, or whatever they may be termed, should be well fitted and made so that they can be unscrewed easily, and as often as is necessary. Then even those with a crown vent would not prove to be as objectionable as they are, though the writer does not by any means endorse the crown vent.

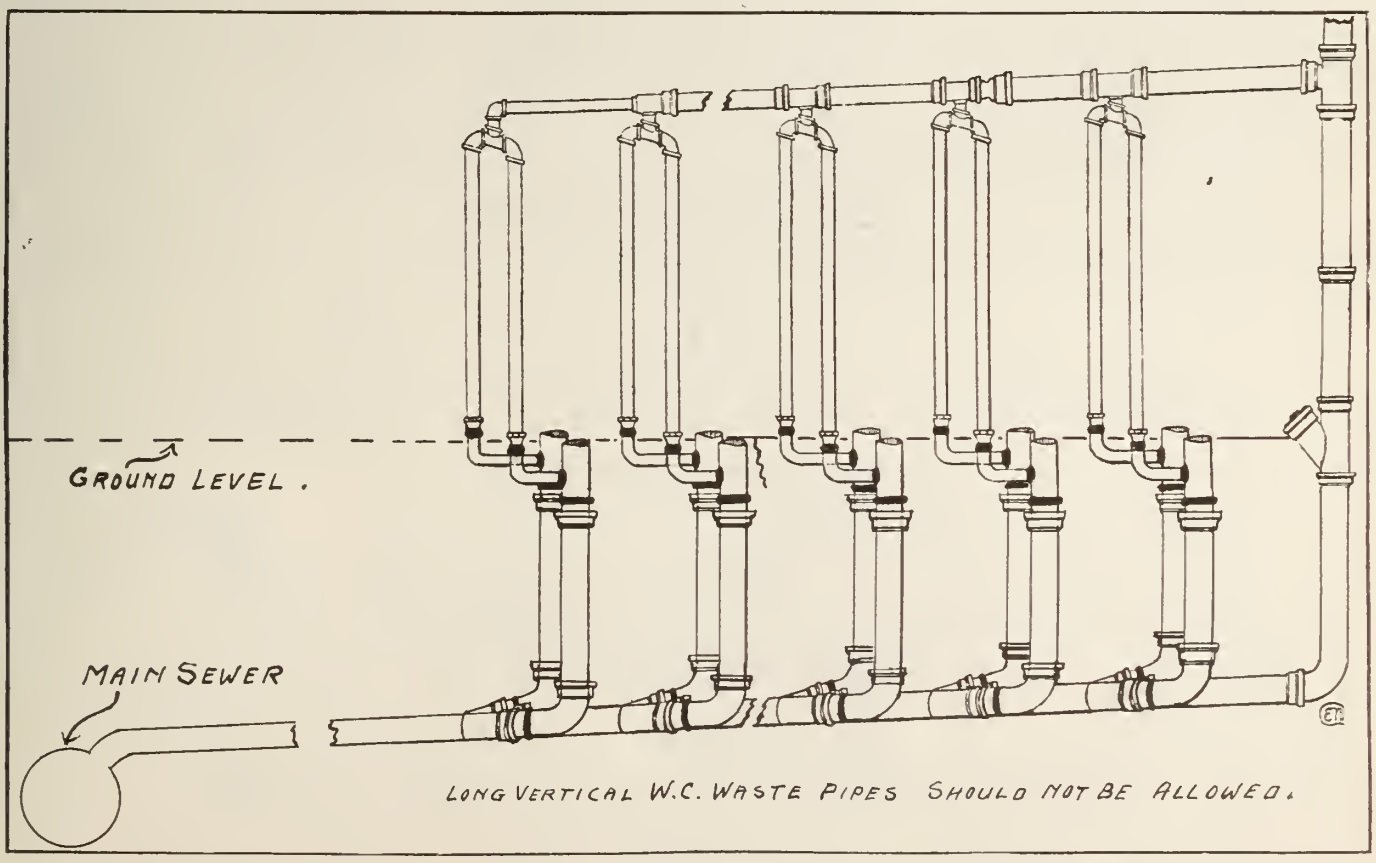
Another very important problem which should receive more consideration is that of the location of fixtures.

The Sanitary Engineer has time and time again stated that all plans of buildings should first be submitted to the health department (not the architect's department.) before a building permit is granted, our chief reason for the assertion being this:

When the plan of a building is submitted to the owners, the latter has the various rooms laid out in such a way as to require the sanitary fixtures to be installed all over the building, not always because it is absolutely necessary, but, merely as a matter of taste.

Such installations require, not only long waste pipes, but also increase the number of vents. A case was brought to the writer's notice a few weeks ago where a gentleman built several houses in which the sinks were placed in such a way (as required according to the by-law) that the waste pipes were 18 feet long and a separate vent stack furnished, just for the sink. The owner was complaining to the writer of having to run a vent pipe up three stories through the roof just for a sink. When informed the why and wherefore, he remarked,

(Continued on page 56.)



Vertical W.C. waste pipes too long which which made it necessary to vent each W.C.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of Sanitary Engineering Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Cc., A.M. Can. Soc. C.E

SANITARY Science, as defined by Gerard, is the science pertaining to the maintenance of health and to the prevention of disease both of communities and of individuals, and the sanitary engineer is an engineer who carries out these works of civil engineering which have for their object:

(a) The promotion of the public and individual health.

(b) The remedying of insanitary conditions.

(c) The prevention of epidemic diseases.

The general practice of the sanitary engineer includes:

Heating and ventilating of buildings.

Plumbing and drainage.

Sewage disposal: and less generally:

Garbage disposal.

The prevention of river pollution.

The improvement of polluted water supplies.

Street paving and street cleaning.

Town planning.

The preparation of sanitary surveys.

Disinfection, cremation and the sanitation of buildings.

To thoroughly understand the principles involved in carrying out the works above named would require the study of a great number of subjects, but in many cases the general practice has been standardized by custom or by-law.

It is the intention in these articles to discuss in a simple way a few subjects, a knowledge of which is necessary for the intelligent understanding of sanitary engineering.

This article is the first of a series which will appear in future issues of The Sanitary Engineer. It is being specially prepared for those of our readers who feel that they need the scientific as well as constructional education.

No profession is of more important a nature than that of sanitary engineering, and as plumbers are gradually but surely evolving from the mere mechanical artisan to the professional, so those who are engaged in this profession will require the scientific as well as mechanical training.

It is with this aim in view that The Sanitary Engineer is publishing this series which will be a complete elementary course in practical sanitary science.

If the duty of the sanitary engineer to the community is to promote its health, remedy unsanitary conditions and prevent epidemic or transmissible diseases, then he should know something of the cause of disease and the mode of infection, something of the cause of unsanitary conditions, so that he can prevent or remedy, as the case may be, thus aiding in promoting public and private health.

There are two classes of diseases:

(1) Those that can be transmitted in any way from one person to another.

(2) Those that cannot be transmitted.

The sanitary engineer has to contend with the first class only and as we will later find, of transmissible diseases, he is mostly concerned with what are termed "water borne" diseases, or diseases transmitted by water. Everyone has heard of the germ theory of disease and the public has a half knowledge of what are variously termed germs, microbes, micro-organisms, bacteria.

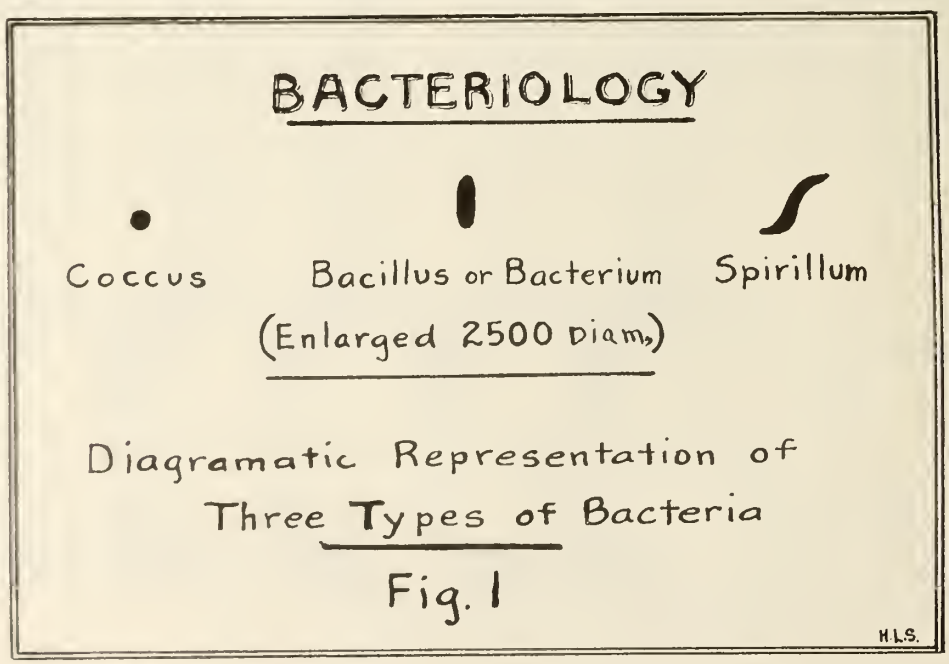
At the bottom of the scale of living things there exists a group of organisms to which the name of bacteria is usually applied. Bacteria are very, very small plants composed of one cell. (See Fig. 1.) They are often termed microbes or micro-organisms because, like many other small plants and animals, they cannot be seen without the aid of a microscope. Some bacteria are even so small that they cannot be seen with the strongest microscope, and only when there is a large number of them together can their presence be detected.

There are two classes of bacteria:

(1) Pathogenic, or those causing disease.

(2) Non-pathogenic, or those not causing disease, and in both the sanitary engineer is very much interested. The first class should be studied as the cause of disease and we might apply to them the term insanitary. To the second, on the other hand, we might apply the term sanitary as they act as scavengers and cleaners and they should be studied in that connection. In reference to the second class, Ducloux has said:

"Whenever there is decomposition of organic matter, whether it be the case of a weed or an oak, of a worm or a whale,



the work is performed by infinitely small organisms. They are the important, almost the only, agents of universal hygiene: they clear away more quickly than the dogs of Constantinople or the wild beasts of the desert the remains of all that has had life; they protect the living against the dead. They do more; if there are still people living, if, since the hundreds of centuries the world has been inhabited, life continues, it is to them we owe it."

Our aim should be to exclude harmful bacteria from water supplies and to encourage bacterial growth to aid in sewage disposal. In these connections, then, we will study something of bacteriology in these articles.

Pure water is probably the greatest essential in promoting proper sanitary conditions. To determine whether a water supply is pure, wholesome and sanitary we can employ the following means:

1. A sanitary inspector.
2. A microscopical examination.
3. A bacteriological examination.
4. A physical examination.
5. A chemical examination.

It is not necessary that the sanitary engineer should make his own examination or analysis: he should, however, be able to make a sanitary inspection, which may, in some cases, be sufficient. He should know how to properly collect water samples for analysis and should be able to report his findings to the analyst to whom he sends his samples.

A sanitary inspection or survey should give thorough knowledge of the source of a water supply and of the possibility of pollution.

A microscopical examination makes it possible to discover plants and animals larger than the bacteria but still too small to be seen and studied without a microscope (see Fig. 2), and may aid in showing if a water is polluted with sewage or show why it is unsavory.

A bacteriological examination is necessary, as it is the harmful bacteria in water that cause infectious diseases. But such an examination does not always prove that a water is polluted. Combined, however, with a chemical examination we can be almost certain that one or the other will indicate an infected water.

A physical examination is made to determine the temperature, color, turbidity and odor of a water. It is, of course, desirable to have a clear water with no objectionable taste or odor. A water may have all the objectionable qualities of color, turbidity, odor and taste and, while unpleasant, may, however, not be detrimental to health. On the other hand, it should be well noted that a clear, sparkling water pleasant to the taste may be decidedly impure and cause the spread of disease.

It is not practicable in these articles to give a course in sanitary chemistry. We will try, however, to gain some knowledge of elementary chemistry. The meaning of some of the terms used will be explained so that the reader will be able to intelligently read a report on the chemical analysis of water or sewage.

If the only available water supply is proven to be polluted, then the engineer must be able to recommend a remedy, which will generally be filtration. There are many kinds of filters advertised and some knowledge of the principles involved is essential to enable one to make a wise choice between efficient and inefficient filters.

The aim of the engineer should be to provide pure air as well as pure water for his clients. Something will be said, therefore, in regard to the principles of ventilation.

The sanitary disposal of sewage is probably the biggest problem that confronts the sanitary engineer and we will later apply what we learn of bacteriology and sanitary chemistry to this matter. In this connection the design of domestic sewage disposal plants under varying conditions will be discussed.

In summarizing what has been stated in this article, the subjects we are most particularly to discuss and study in future articles can be generally included under the headings of: Bacteriology, Sanitary Chemistry, Sanitation.

(Continued in next issue.)

PLUMBING EXPERIMENTS IN CALGARY.

Some interesting experiments in connection with plumbing problems involved in modern high buildings are being carried out in connection with the evening technical classes in plumbing and sanitation. Some weeks ago Mr. James Marr, sr., gave a lecture to the students, in which he displayed models of a new system of venting, which, if adopted, would result in increased efficiency of operation and a large saving in the cost of installation. His theories caused considerable discussion amongst the students and employers present, and opinions on the system were divided.

Mr. Marr has now constructed a full-sized model of one unit of the system and placed it in the school for the benefit of the students. Arrangements are also in progress whereby a full size installation will be placed in some building in the city and experiments carried out jointly by the trade and the city plumbing department.

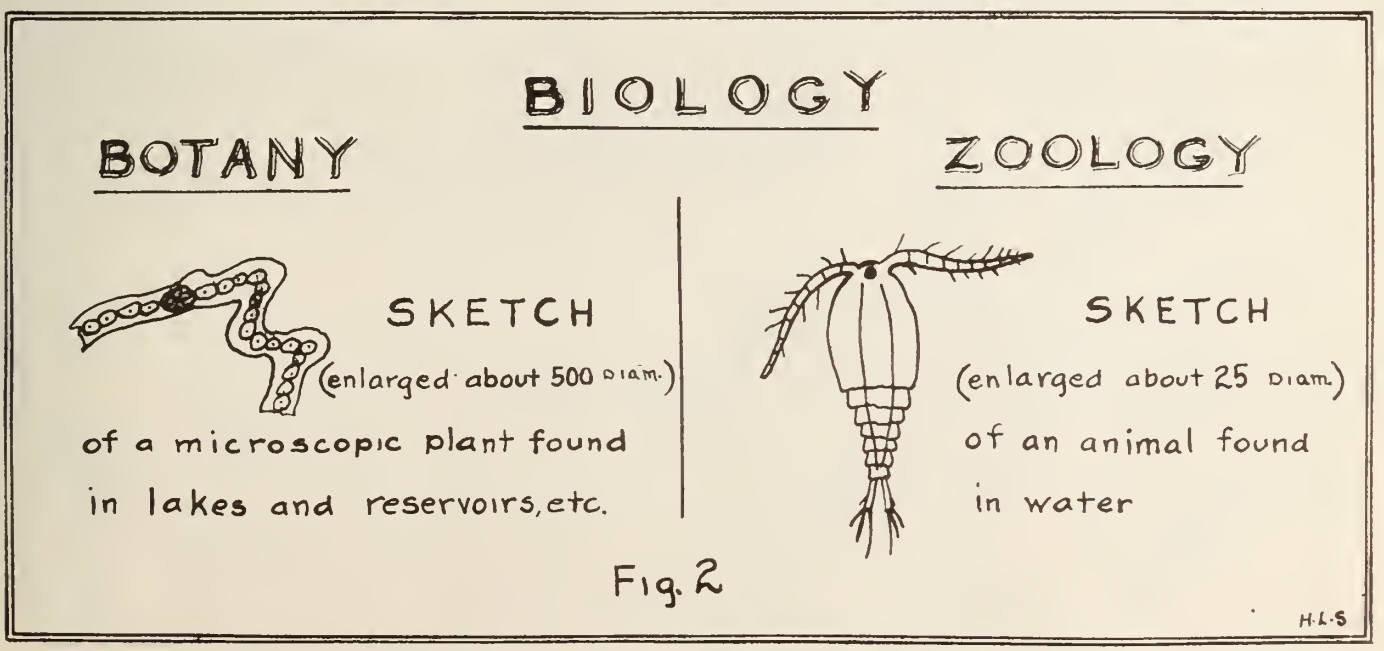


Fig. 2

The Principle of Elbow Pattern Developing

A Complete Course, Treating in a Simple Way, the Art of Elbow Pattern Developing. Specially Written for Those Who Have Only Received a Limited Geometrical Education.

By EDWIN NEWSOME

THE elbow patterns so far dealt with have all been either round or oval. We propose taking up the problems of developing patterns for elbows, or bends, with square ends and sides. These elbows are used mostly for warm air furnace work and require to be neatly made, so that they will fit well and look neat when installed.

Fig. 1 shows an elevation and plan of an elbow which has all four sides the same size. It resembles a three-piece elbow were it not for the plan. The dotted lines show the allowance for lock. When this allowance is made only one fold is needed for these pieces, of which there are two. To complete the pattern for this elbow there will also be required one piece as shown at pattern B2, and one piece as shown at pattern A. These two pieces will require twice the amount of allowance for lock which was allowed for patterns in Fig. 1. The reason for this is shown at the lower corner of this drawing, which gives an enlarged view of locks, 1 being the first fold, 2 the first half of lock, and 3 the lock or seam completed.

Fig. 2 shows the elevation of a flat elbow. We have not shown a plan of this because it is simply half the width of Fig. 1. The pattern for B2 is exactly the same as B2, Fig. 1, but Fig. 2 requires a different pattern for the underneath piece C. The pattern for this piece is shown at pattern C. Fig. 3 is somewhat of a different kind in elevation, and requires a little different method to develop, even though the plan is exactly the same as Fig. 1. While in Fig. 2 the pieces B2 and A have square corners. Fig. 3 is quarter round, and the patterns for E and D must be developed by the use of a stretchout line. This is done by drawing any straight line and transferring the measurements shown at D, 1, 2, 3, 4 and 5 to the line X X at pattern D. This operation is repeated to develop pattern for the underneath piece E, and is shown at pattern E and line O O, 1, 2, 3, 4 and 5, while Fig. 1 and Fig. 3 would both fit the same pipes and are exactly the same radius. It should be noted that it will require a longer piece of material to make patterns B2 and A than it does to make patterns D and E.

To develop half or 45 deg. elbows all that is necessary to do is to cut patterns in two and break in the same place as is shown for the full or 90 deg. elbow.

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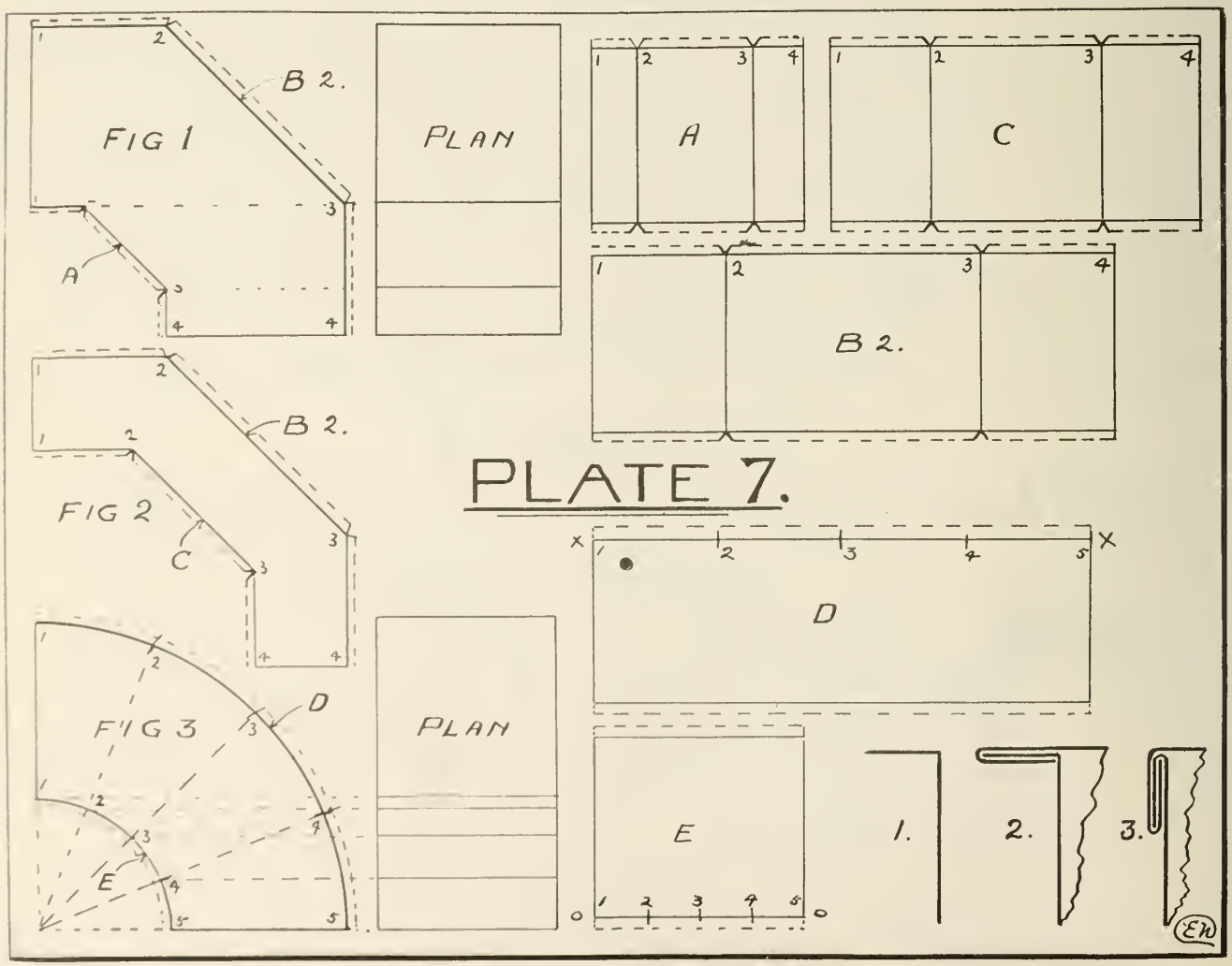

Practical Course for Sheet Metal Workers

ARTICLE No. 14 OF SERIES

By CHARLES SEIVERS

IN this article we will take up the question of square pipe and several steps for its development.

In Fig. 1 at A is a section through pipe giving width of front and sides. B and C are front and side elevations of same. As the object shown in this case is of same size at top and bottom, its development is quite simple. At D is shown a pattern for a piece of pipe the size and length as shown at A, B and C.

Draw two lines parallel to each other, and a distance apart equal to length of B or C as shown in 1-2 and 3-4; at one end draw a line at right angles to 1-2, connecting it to 3-4 at point 3 as shown by 1-3. From this line mark off the width of face of pipe as at B, then the width of end as at C, and repeat to complete pipe.

Next draw a line connecting the last two points as shown by 3-4, from line 4-3 mark off the seam allowance; on this edge usually the single edge is allowed, and from 1-3 mark off the double edge.

In Fig. 2 are shown three different bends or angles in a piece of square pipe, as the development or offset at A, and elbow at B are practically the same we will only develop the offset shown at A. The outline of the offset as shown at A forms the pattern of the two ends, all that is needed to complete being to allow the single edge for seaming. The next step is to obtain the two face pieces. Draw two lines parallel to each other and a distance apart equal to width of face of pipe (or as shown at B, Fig. 1). As shown by lines 1-4 1-4, at D at right angles to 1-4 draw a line connecting them as shown by line 1-1. From 1 and 1 mark off the distance 1-2. At A 2-3 and 3-4, draw lines connecting these points as shown by 2-2, 3-3 and 4-4. To complete, allow the seam allowance on two edges 1-4 and 1-4. The piece for opposite face is obtained in same manner using the space 5-6, 6-7 and 7-8.

At C is shown an elbow in which the side of the pipe is the portion to be obtained. As in the bends shown at A and B, the outline shown at C is the pattern, the allowance for edge only being needed to complete. To obtain sides first divide two edges of C as shown. Draw two lines parallel to each other and a distance apart equal to width of end, as shown by 1-8 and 1-8. Draw a line at right angles to 1-8 connecting 1-1; from 1 mark off the spaces obtained on the outer edge of C, as shown by 1-2-3-4-5-6-7-8. From 8 draw a line at right angles to 1-8 connecting 8-8, completing length of pattern. The piece for inner side of C is obtained in the same manner, using the spaces 1-2-3-4-5-6, the seam allowance. A full size of the seam is shown at E; on the part C a single edge is allowed, on the sides then will be required first an allowance equal to the single edge, and then one of double the width. At e 1 is shown the seam when ready to finish and at 2 the finished seam.

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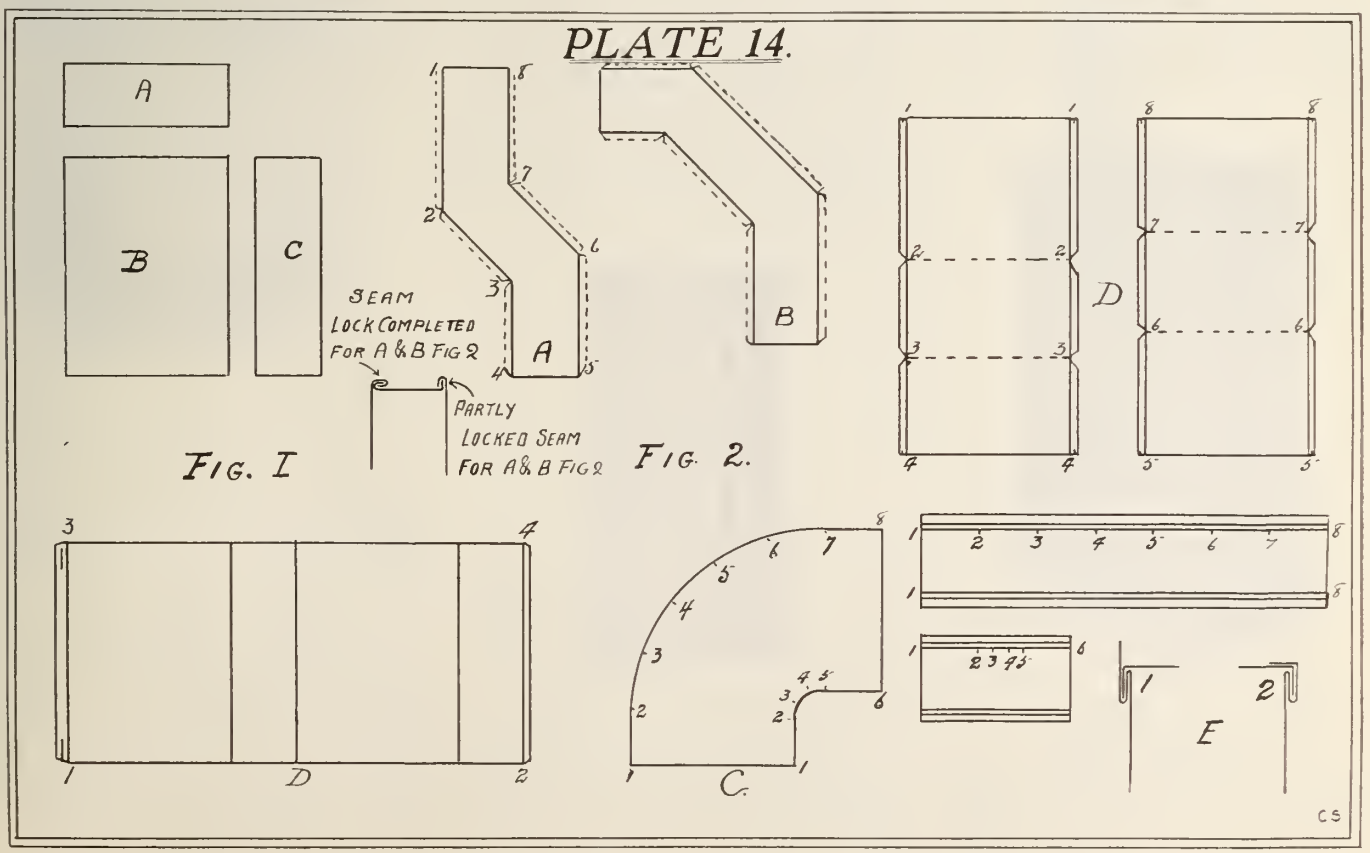


New Sanitary and Heating Goods

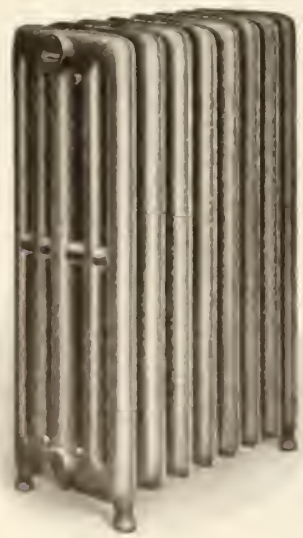
GURNEY FOUNDRY CO.'S NEW LINES.

The Gurney Foundry Co., Ltd., have devoted much time and money recently to bringing before the trade several entirely new lines which cannot fail to be a success, because of the fact that these lines will fill a long-felt want.

Cottage Tank Heater.

Cottage Heater.

This heater is said to have come through some very severe tests, is low in construction and can be fired with soft coal. It is made in six sizes.



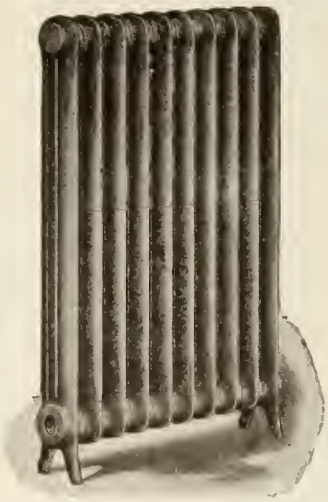
Five-Column Radiator.

Five-Column Radiator.

A five-column radiator cannot fail to be appreciated by the trade. It is made up in various heights, in plain smooth design and about 12 inches wide. For steam or hot water, by the use of such a style radiator, a large amount of heating surface can be installed in a very small space.

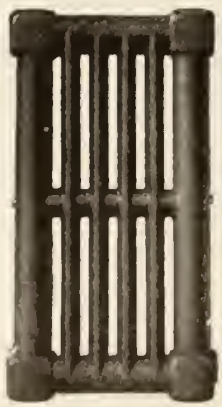
Single Column Radiator.

In many cases where a neat, yet narrow radiator could have been placed,



Single Column Radiator.

particularly when only, say, 12, 15 or 18 square feet of heating surface is required, it has been impossible to procure a suitable radiator. The Gurney Foundry Co. have realized this and have been prompted to furnish a radiator suitable for such cases. No doubt this single column radiator will soon become a great favorite.



Twelve-foot Wall Radiator.

A 12-Foot Wall Radiator.

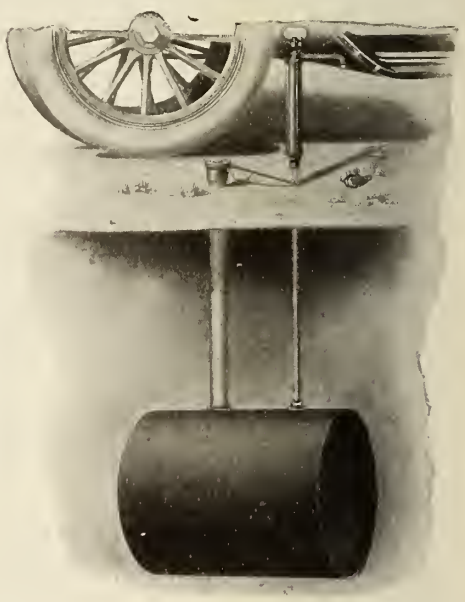
For quite a number of years the wall radiator has only been obtained in three sizes, viz., the 5, 7 and 9-foot section, and very often a fitter would require 12 feet of radiator for, say, a bathroom or W.C. compartment. It has been necessary for him to install two 7-ft. sections, unless he skimped the job and only put 10 feet of radiation in.

The new 12-foot section wall radiator cannot fail to become very popular.

Further particulars regarding these new lines may be secured by consulting the new Heating Engineers' Companion, which is just off the press. Any of our readers desiring to get one of these new books should apply to the company's head office, Toronto.

GASOLINE STORAGE TANKS.

The General Machinery Co. have just issued a very interesting bulletin describing a new line which from now on they are handling, that of gasoline storage outfits, compressors, etc. Those



Simple method of gasoline storage system for auto garages.

desiring to procure one may do so by applying for New Bulletin No. 20, General Machinery Co., Ltd., 22-26 Mulock avenue, Toronto.

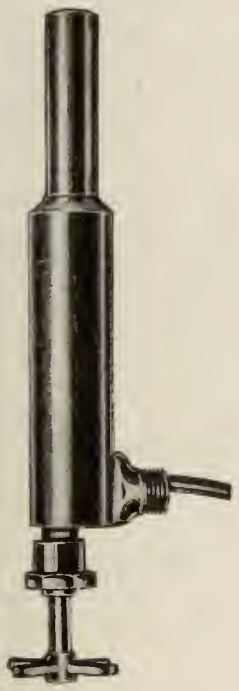
A NEW AIR MOISTENER.

The advantage of adding moisture to the air for the correction of the harmful dry air conditions in houses, offices, apartments, etc., has long ago been recognized, and various attempts have been and are being made to overcome the evil caused by lack of humidity in our homes and office buildings.

The Air Mostener Co., 28 North Market street, Chicago, have placed an air moistener on the market for which they make some very remarkable claims. We have pleasure in showing view of it herewith for the benefit of our readers.

Size No. 1 is best suited for general use. It has a ⅛-inch pipe thread connection fits tapped holes already in most steam radiators, it being only necessary to remove either the small screw plug or the air valve and screw it in place of them.

Nos. 3 to 8 are made for attachment to the steam piping independent of the radiator. These are the styles which will eventually be employed in new work, as it is desirable that the humidification be independent of the heating, so that the temperature will conform to the condition of moisture.

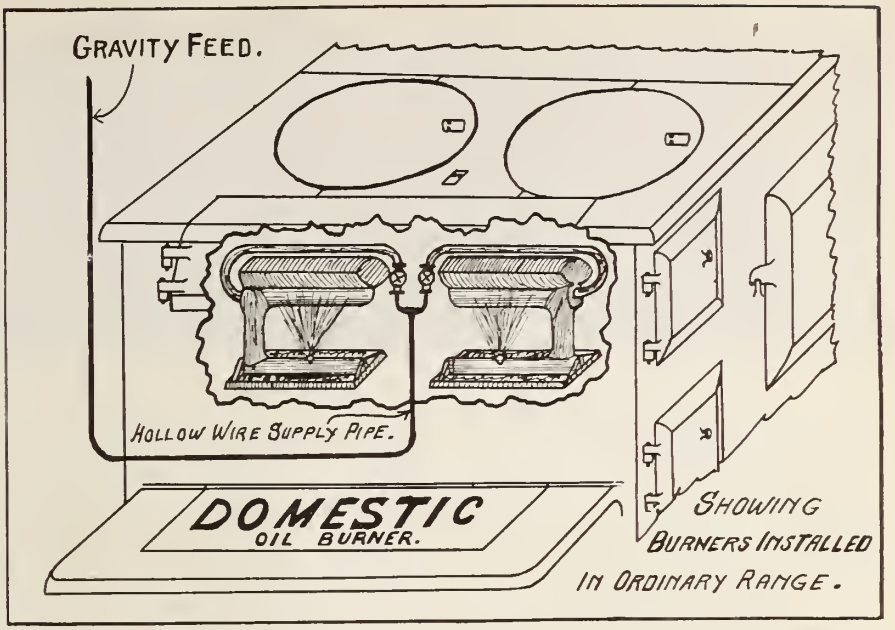


Nos. 1 and 2
For attachment to steam radiators.

Those heating engineers who would like further particulars may procure same by writing to above address.

NEW DOMESTIC OIL BURNER.

This is the day of specialties, the day when money demands special services. Of course staple lines, like bread are necessary, but "Man can not live by bread alone," neither can the progressive business man make money, or give special services if he only handles staple lines. The latest specialty to come to our notice to date is that of a very novel burner which is made for insertion in the fire box of any kitchen stove or range. The claims made for it are unique. It is not only a burner, but a gas generator as well. It requires very little attention, burns the crudest coal oil or kerosene with ease, is clean, has no mechanical parts to get out of order, and has been thoroughly tried out.



This is another specialty which the sanitary and heating engineer can make money on. When installing a sanitary and heating installation in rural residences, he can also install one of these appliances. Further particulars may be procured by writing to The Domestic Burner Co., 342 Queen Street W., Toronto.

NEW BOOKS AND CATALOGUES.

An Interesting Book.

"The Conservation of Humanity," is the title of a very interesting book now being issued by the United Electric Company, Canton, Ohio. In it are some very useful chats on sanitation in the home. It describes TUEC stationary cleaner very clearly and in all shows how necessary these machines are becoming in every home. These books are well worth reading and may be procured by writing to the address given or to their Canadian factory, 159 Richmond street, west, Toronto.

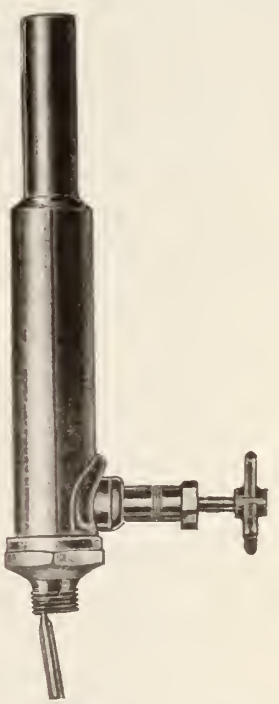
G. M. G. New Catalogue.

The General Machinery Co., Ltd., are getting out something new in the way of catalogues. Apart from the regular features to be found in catalogues, this new book will also contain some very useful data specially compiled for the use of those who intend buying such lines as the General Machinery Co. sell. Copies may be had upon application to the above Co., 22-26 Muloch avenue, Toronto.

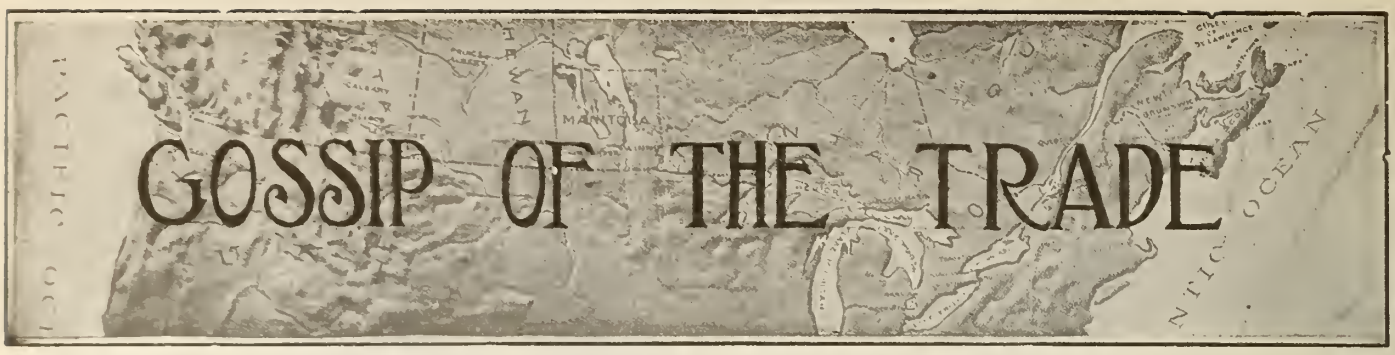
Just Off the Press.

One of the most clearly written books on steam and hot water heating ever published has just been placed in our hands. It is entitled "500 Plain Answers to Direct Questions on Steam, Hot Water, Vapor and Vacuum Heating," by Alfred G. King, and is a book which should be on the book shelf of every heating engineer. In these days the average heating engineer has little or no time to work out the various prob-

(Continued on page 51.)



Nos. 2 to 8.
For attachment to heating system independent of radiator.



The Seriousness of Being Dead.

Stiff with the cold and bound to a pillar in the basement of a shop, Walter A. Kirschner, a plumber, was found dead to-day in a serious condition.—Sheboygan Journal.

Thomas Quigley Dead.

The death occurred of Thomas Quigley on March 10. He was employed by his brother, Martin J. Quigley, 4228 St. Catherine Street West, Montreal, and was 55 years of age.

New Partnership.

Dunnville, Ont.—Alfred Wall and Frank Dougher, formerly of Buffalo, have started a general plumbing business here under the name of the Dunnville Plumbing and Heating Company.

Partnership Dissolved.

Announcement is made of the dissolution of the partnership existing between D. W. Gallagher and G. Lythgoe, plumbers, Weyburn, Sask.

The business will be continued by Mr. Lythgoe, who will vacate the premises now in occupation, having decided to erect a new building immediately alongside the present stand.

More Work for Sanitary Engineers.

The Toronto Board of Health are preparing plans to have between 200 and 300 sanitary equipments installed in the homes of owners who are not able financially to install the necessary plumbing.

This is what we would call a move in the right direction. It will give work to men out of employment, just at a time when work is appreciated by all. If every city in Canada would do likewise there would be fewer skilled mechanics out of work than there are at present.

Famous Lacrosse Player Dead.

William Gourlay, one of the greatest exponents of Canada's national game, died in St. Catharines on March 17. Gourlay was a clever home player, and one of the best in Senior C. L. A. Twelve years ago he hung up his stick because in practice he accidentally injured the oldest member of the team. He was a native of St. Catharines, a member of the firm of Gourlay & Son, sanitary and heating engineers, and a prominent Mason. He was 38 years of age. He leaves a widow, but no family.

Robt. Yeomans Elected Member of Toronto's Board of Health.

Sanitary engineers throughout the Dominion are at last coming to their own. This year city after city has seen the advisability of appointing a practical sanitary engineer as one of the members of the Board of Health. The most recent to be thus honored is that of Robt.

ALDERMAN R. M. YEOMANS, recently appointed a member of the Toronto Board of Health.

Yeomans, Toronto. Mr. Yeomans is one of the most popular members of the Toronto City Council, and we are pleased to see him put into such a position, knowing full well that he will make good.

Mr. Yeomans being a man of wide experience will be able to show the citizens of Toronto, as well as the trade throughout the Dominion, that there is need for such men as members of every board of health.

Made-in-St. John.

An unusually interesting display was made recently in the hardware store of T. McAvity & Sons, in King st. Much has been said and written in favor of the "Made-in-Canada" movement, and the slogan has become universal throughout the Dominion, but this was a "Made-in-St.-John" display, and it presented an appeal of much patriotic and civic interest. The display consisted entirely of articles produced in the company's big workshops and factory here, and filled several windows.

In one window was shown a variety of iron body globe and gate valves; another displayed ship pumps of different kinds; in another was seen an exhibit of locomotive mountings; while still another contained an extensive display of brass finishings. Besides these, there were many other articles giving an idea of the diversity of products manufactured by the local concern which has a market throughout all parts of Canada and many other quarters of the world.

MUNICIPAL UNDERTAKINGS.

Markham, Ont.—It is proposed to install a waterworks system. James Loudon & Hertzberger, of Toronto, are the engineers.

Wallaceburg, Ont.—The Wallaceburg Brass Co. have received an order for a large number of plugs and sockets for shrapnel shells.

London, Ont.—The Dominion Government will make a grant of $5,000 for each of three subways that it is proposed to construct. The total cost for each subway is estimated at $50,000.

Bracebridge, Ont.—By-laws will be voted on by the ratepayers on April 12 to authorize raising $4,000 for new pumps; $2,700 for main extensions; $5,300 for other improvements in connection with the waterworks system.

Newmarket, Ont.—At the regular meeting of the town council held last Monday it was decided to install a new reservoir at the waterworks. The reservoir, which will cost $2,500, will be made of reinforced concrete.

Ottawa, Ont.—At a recent meeting of the city council, the motion of Controller Ellis to ask the Legislature to approve of raising $400,000 to provide for the building of the Lemieux Island overland pipe was carried without dissension.

Brockville, Ont—The special committee of the Water and Light Departments and the Board of Health have recommended the construction of a rapid sand filter plant of the gravity type, at a cost of $85,000, and that a new 24-in. intake pipe to run 500 feet into the river be purchased, the intake estimate being $7,000.

SOME NERVE.

The following is copy of a letter sent to a sanitary engineer by a member of a large firm of lawyers.

In the first instance this sanitary engineer installed the whole sanitary engineering in the lawyer's residence which is situated about two miles away from his own establishment and as will be seen, the letter is asking that Jones make a casual call and bring a competitor with him, etc.

Dear Jones.—We find that the soft water pump is out of order and has been for some time. When we turn the water on the pump keeps working and it is apparent that something is wrong.

Will you be up our way some time? Perhaps you could get some local plumber over with you, Mr. Brown for instance, who could be instructed by you as to exactly how the thing works and could perhaps rectify any trouble from time to time.

Yours truly,

Our reason for reproducing this letter is simply to show our readers the nerve even the legal fraternity have.

The fact of the matter is that the legal profession are no exception to the rule. The public are doing it every day. If every time a sanitary and heating engineer gave any information out to another person, he were paid for the advice, there would be fewer sleepless nights, worrying how the "Sam Hill" that draft was going to be met, etc.

Duns and Bradstreet would be pleasanter reading than it is when looking over the ratings of this one and that one.

"Why did you do the job so cheaply?" is a question we frequently hear. "Well, you see, he's a good friend of mine and I've done work for their family for ten year. I hate like H—— to soak him the real price." There's the whole thing in a nutshell. We've got too many **friends**, too many friends for what they get out of us.

"Bear ye one another's burdens," is the last thing those friends of the sanitary and heating engineer ever dream of doing.

The self-made man might sometimes exercise more care in selecting his materials.

MONTREAL NOTES.

Change in Montreal By-law.

It has been history often repeated that the man who went in search of a gas leak found it, but that the services of the Fire Department were required. The common practice in such searches is to light a match or carry a lighted candle. In future this will be bad form in the City of Montreal. The City Council on March 8 adopted the by-law proposed by Alderman Loranger on this matter.

The first two sections of this new regulation read:—

"Sec. 1.—No person shall use any lamps other than electric lamps when looking for gas leaks or other defects in plumbing fixtures, under pain of the penalty hereinafter provided.

"Sec. 2.—No person engaged in any plumbing work in any building in the city shall light inside of such building, any alcohol, gasoline or other mineral oil heaters, nor shall put any alcohol or oil in such heaters. This latter operation shall be done outside of the building."

The penalty is a fine not exceeding forty dollars, or, in default, imprisonment not exceeding two months. It frequently happens, however, that the unwary who carry an open flame light in hunting for the escaping gas pay an immediate physical penalty.

The Montreal Plumbers' Board of Trade, learning the above from the newspapers, wrote to the city clerk asking if the information was correct. If it is, the matter will be discussed at their coming meeting.

NATIONAL CONVENTION AT ST. JOHN. N.B.

The next national convention of the Canadian Society of Domestic Sanitary and Heating Engineers, is to be held this year in St. John, New Brunswick. This was decided upon at the last convention which took place in Ottawa.

It may seem to some that St. John is a long way to travel for a convention, but those who have attended previous conventions cannot fail to recall that the members from New Brunswick have always been well represented.

The members of the Maritime Province have turned out loyally. They have shown great interest in the proceedings and in all fairness to the efforts they have put forth in the past, as well as the work they have undertaken to accomplish, and no doubt have accomplished during the year these members have been in office, we think every one interested in the trade should make an earnest effort to either be present or be represented.

We have every assurance that the officials of the association are working hard to make this coming convention the most practical and pleasant convention ever held in the history of the trade, and business will not be so pressing as to keep one at home. This being the case every member will do well to attend and make the event a holiday and, at the same time, a vital business trip. Read over carefully each issue of The Sanitary Engineer for news items about this very interesting event. The dates appear on another page of this issue in Bulletin No. 1.

THE IMPORTANCE OF PROPER AIR CONDITION.

Air always contains some moisture, depending on its temperature and the amount of water available for absorption. Its capacity is relative to its temperature. Warm air can absorb and hold a large amount, while cold air can absorb but a small amount. In cold weather the air out of doors contains little moisture and enters the house or apartment in this condition, where its temperature is raised many degrees, with the result that its capacity for moisture is greatly increased and the amount present before the air entered the house and became heated is no longer sufficient to satisfy the changed condition of higher temperature. The result is that the hot air, in an effort to satisfy this demand, takes moisture from any available source.

The most harmful source of moisture abstraction is from the human body, as health and personal comfort are affected in a variety of ways, some of which are as follows: The skin is dried, causing winter itch; the scalp, causing baldness; the nose, causing colds; the tonsils, causing enlarged glands; and in general making the system more susceptible to the entrance of germs.

Dry air damages furniture, interior woodwork of houses, musical instruments, books, pictures, especially oil paintings, house plants, flowers, etc.

Dry air causes evaporation from the skin, which carries heat away from the body so rapidly that coldness is produced, unless the temperature is excessive. With proper humidification a much lower temperature is sufficient for comfort, because the heat of the body is not lost by evaporation. This is a very important fact, affecting the cost of fuel, for by proper humidification coal bills may be reduced by at least 10 per cent.

In many instances the advantages of humidification are not realized because the means employed is inadequate, water pans placed on radiators give but a fraction of the moisture needed. Unless a feeling of warmth is experienced when the thermometer is from 62 to 65 degrees, it is evident that the humidity is not

high. With a proper humidity 70 degrees is entirely too warm for comfort.

BIGGER PROFITS.

Unique Reason Given.

At the annual meeting of stockholders of the American Radiator Company, held recently, the financial statement of the parent corporation for the year ended January 31, 1915, was presented, showing net profits of $2,289,075, an increase of $207,808 over the preceding twelve months. After allowing for the preferred dividends, there was a balance of $2,079,075. This is equal to 25.39 per cent. on the $8,185,600 common stock, against 25.19 per cent. on the $7,441,500 common stock in the previous year.

In his report to stockholders, President Clarence M. Wooley says in part:

"The high interest rates which prevailed greatly restricted construction of new buildings throughout the country; the number of permits issued was considerably smaller than in the preceding year. While the greater part of the demand for boilers and radiators comes from the construction of new buildings, their introduction in old buildings has become a very important part of the total demand. The business from this source is gradually increasing."

Editorial Comment.

While it may not interest the majority of our readers to know of the doings of an American company, it should interest them to note the reason why the American Radiator Company could show an increased profit at a time when the building trade is almost at a standstill, and has so been for almost a year.

Mr. Woolley shows that their business has not entirely depended upon the supplying of boilers and radiators for new buildings, but rather for reconstructions and the introducing of steam and hot water heating systems into buildings which previously had been heated by some other means. The Sanitary Engineer has urged upon the trade from time to time the need for their looking up new business, and any heating engineer who knows where there is a poor hot air furnace installed should get right after the owners to instal a modern up-to-date hot water or steam heating system. If landlords wish to hold their tenants these days, they can do nothing which will please their tenants more than having their plumbing and heating installations overhauled. Therefore we feel sure that by a little hard canvassing on the part of the sanitary and heating engineer, great good can be accomplished.

A NOVEL STEAM CAR.

The C. A. Dunham Co., of Marshalltown, Iowa, which is the parent company of the Toronto firm of that name, held their annual conference at Marshalltown recently. Every representative of the two houses was present and they discussed some very interesting problems relative to their business and the service they could render the heating trade during the coming year. The Dunham traps and other specialties no doubt are enjoying a great deal of confidence with a large quantity of heating engineers.

It however transpires that this well-known company have added another line of specialties to their list, a picture of which is shown herewith. For some time we are told, their worthy Chicago representative, W. Best, has been doing his level best to acquire a car, and notified the head office at Marshalltown that unless he was supplied with one very soon, the orders for Dunham traps would be running after him, instead of him

Best's Steam Car.

running after the orders, and of course this might result in friend Best being "run over."

However, rather than have this happen the company presented Mr. Best with a car of their own make. It is a steam car and is guaranteed to check the speed limit of all steam, and at the same time will "pass by" any water it comes in contact with. It will make a winter's coal bill look like 30 cents, at least so we are told.

This car, too, has another very novel feature about it, viz., that while its tires are vented they never leak or puncture. The car is made up by using Dunham traps for wheels, headlights, and steering wheel, and a Dunham trapped radiator is doing service for the car radiator and an air vent is taking the place of a presto-lite cylinder at the foot board of the car.

This car, unlike any other, does not tear up roads thus being a source of worry to every highway commissioner, but it makes all roads to every Home-Comfortville as pleasant as possible.

Last but not least, anyone taking a trip in the Dunham car never runs short of gasolene.

A MATTER OF STATIONERY.

(Continued from page 38.)

tors in making a success in the retail business."

Some speciment letterheads form part of this article and these have been reset on the opposite pages. In some of these it is believed vast improvements have ben effected in the typographical appearance. In others alterations have been made to suggest new styles, while no great fault can be found with the old.

There is little to criticize about the original of No. 5, though the elimination of the underscore rule from beneath heavy capitals and the emphasizing of the word "hardware" are good points to notice in the reset.

Script type as in No. 6 is inappropriate for a hardware business. The line of goods suggests strength such as secured by a bold text (see reset) or even a still plainer letter such as a square gothic. Script is more in line with a milliner's letterhead or that of a professional man.

It's hard to tell at first whether the original in No. 7 is intended for an account form or a letterhead. The type arrangement is not open to serions criticism considering the copy supplied by the customer. The reset suggests that the lines for writing name and address be eliminated and that the arrangement be "modernized." Note neatly balanced grouping.

In No. 8 original we again see an instance of the use of an inappropriate type face. Here the type is too heavy. Note the more "booky" appearance of the reset.

TAKE TIME TO READ.

The man who will not take time to read his trade newspaper is on a par with the man who is indifferent with regard to the potentialities of his staff. Why? Because the means by which a merchant must inform himself as to features of the market and activities throughout the trade are just as great a factor in his success as the staff through which he hopes to deliver the goods. In each case there must be reliability, confidence, in order to obtain most satisfactory results.

There are mighty few sign-posts on the road to success.

It's all right to believe only half you hear: but the trouble is to know which half.

Ontario Society Convention

Item of Interest Which Will Take Place at the Coming Convention.

AS previously announced, the Ontario Society of D. S. & H. E. will hold their fourth annual convention in the Canadian Foresters' Hall, 22 College Street, Thursday, Friday and Saturday, April 22, 23 and 24.

All members are eligible to attend and vote on all questions which are dealt with throughout the convention. It is hoped that a large number will be on hand so as to take part in all matters taken up in the interest of the craft.

Other Items of Interest.

Among the numerous questions which will be taken up will be the following:

New regulations governing the installation of plumbing throughout the Province of Ontario.

The Workmen's Compensation Act as it is affecting the trade.

The new regulations of the Steam Boiler Act and its bearing upon the heating trade.

Revision of the constitution and by-laws of the society.

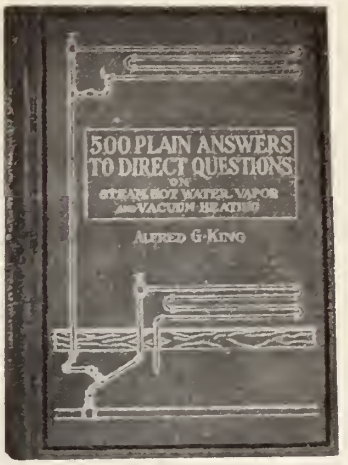
NEW BOOKS AND CATALOGUES.

(Continued from page 47.)

lems with which he is constantly confronted. It is a book highly illustrated and comprised of over 200 pages, size 6 x 9 inches, and to those whose educational training has been limited, will prove to be a valuable assistant. Further particulars as to price, etc., may be had upon application to Book Department, MacLean Publishing Co., Ltd., 143-153 University Avenue, Toronto.

New Fitters' Companion.

To be successful in estimating for heating systems, the heating engineer must be in possession of accurate data. The "rule of thumb" day has set, never to rise again and the heating engineer who clings to the old way will soon begin to realize that he is a back number. To date we have not seen a more complete heating engineer's book than one which is just off the press, and which is being issued by the Gurney Foundry Co., Ltd., Toronto.



New Heating Book.

The contents are "right up to the minute," and consist chiefly of copyrighted data. Those desiring to procure

New Fitter's Companion.

one of these books may do so by applying to above address.

New Establishment.

Edward Lahey, of Merritt, B.C., has started in business. He intends carrying on a plumbing, tinsmithing and repair shop. We understand Mr. Lahey has had 30 years' experience and he should, therefore, be successful in his new undertaking.

Letter of Condolence.

The members of the Ontario Society of Domestic Sanitary and Heating Engineers beg to convey their heartfelt sympathy to the relatives of the late William Gourlay, son of S. P. Gourlay, and partner in the firm of S. P. Gourlay & Son, sanitary and heating engineers, St. Catharines, Ont. The late Mr. Gourlay was not only a good worker at his trade but also one of the finest lacrosse players in Ontario. He will be missed and mourned by a very large circle of friends throughout the province.

PROGRAMME.

First day—

Meeting of the directors and executive committee. All the chairmen of the various committees are requested to be on hand at this meeting.

Other members are all welcome.

This meeting will be held in the Toronto society headquarters, room 507. (Same building.)

Please Note.

All out-of-town members will please register at the above room during the afternoon.

Guests of Toronto Society.

8 P.M.—The members of the society will be the guests of the Toronto committee, when an illustrated lecture will be given with limelight views by E. S. Stack, Esq., the subject being gas water heaters.

This event will also take place in the Canadian Foresters Hall.

2nd Days Proceedings.

9 A.M.—Roll call.

9.15 A.M.—Appointment of special committees.

9.30 A.M.—Report of the Board of Directors.

11 A.M.—Report of committees.

1.30 P.M.—General business.

4 P.M.—Election of new directors and chairmen of committees.

During the evening the members will attend the theatres in several parties.

Third Days' Proceedings.

9 A.M.—Unfinished or new business.

At the conclusion of business the members will be tendered an "Auto" ride round the city.

Invitation to Visit Plant.

The Dominion Radiator Co., Ltd., have extended a pressing invitation to all the members of the trade to visit their plant. It is hoped as many as possible will avail themselves of this invitation, which cannot fail to be of great educational value to one and all.

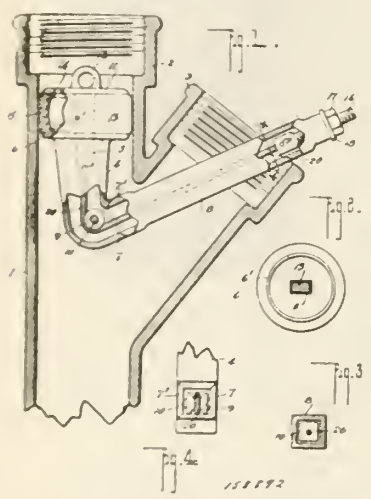
New Canadian Patents

158,892.

Duncan McKenzie, Winnipeg, Manitoba, Canada, 10th November, 1914; 6 years. Filed 5th June, 1914. Receipt No. 239,699.

Claim.—1. A smoke plug comprising an expansible member fitted with an extending shank, a pipe having one end demountably associated with the shank, a flexible member connected with the expansible member and passing normally through the shank and pipe, removable means for adjusting the tension in the flexible member to expand the expansible member, said adjustable means being located at the free end of the pipe, as and for the purposes specified.

2. A smoke plug comprising an expansible member fitted with an extending shank, a pipe disposed at an angle to the



Smoke Plug for Pipes.

shank and having the inner end demountably associated with the shank, a cable connected to the expansible member and passing normally through the shank and pipe, and means located at the outer end of the pipe for adjusting the tension in the cable and thereby effecting the expansion of the expansible member, as and for the purpose specified.

3. A smoke plug comprising an expansible member fitted with an extending shank a pipe extending at an angle from the shank and having the inner end thereof demountably associated with the shank, an adjusting bolt carried by the outer end of the pipe and fitted with a washer, and an adjusting nut bearing on the latter end of the pipe, and a cable connecting the bolt with the expansible member and passing through the pipe and shank, as and for the purpose specified.

4. A smoke plug comprising an expansible member, a cable connected with the expansible member, and demountable means associated with the expansible member and the cable for adjusting the tension in the cable and effecting the expansion of the expansible member, as and for the purpose specified.

5. A smoke plug comprising an expansible member fitted with an open centered extending shank, a pipe disposed at an angle to the shank and having the inner end thereof demountably associated with the shank, an adjusting bolt located at the outer end of the pipe and extending within the same, an adjusting nut on the bolt and engageable with the pipe end and a cable having one end secured to the inner end of the bolt and the other end connected with the expansible member, said cable passing through the open centers of the shank and pipe, as and for the purpose specified.

6. A smoke plug comprising an expansible member fitted with an extending open centered shank, a hollow pipe disposed at an angle to the shank and having the inner end thereof socketed in the shank, an adjusting bolt extending within the outer end of the pipe and fitted with an adjusting nut engageable with the latter end of said pipe, means preventing the turning ofthe bolt in the pipe, and a cable connecting the inner end of the bolt with the expansible member, said cable passing through the open center of the pipe and shank, as and for the purpose specified.

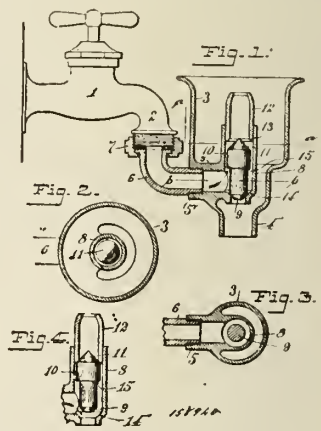
7. A smoke plug comprising an expansible member fitted with an extending open centered shank, a pipe having a hollow square center and the inner end thereof socketed in the shank, an adjusting bolt located in the outer end of the pipe and having the inner end thereof squared to fit the square center of the pipe, an adjusting nut on the bolt, said nut normally engaging the adjoining end of the pipe, a roller located in the shank at the juncture of the shank and pipe, and a cable connecting the inner end of the bolt with the expansible member, said cable passing through the open centers of the pipe and shank and around the roller, as and for the purpose specified.

8. A smoke plug comprising a shank fitted with an open center and carrying a lower face plate supplied on the upper side with a projecting rib, an upper face plate disposed above the latter face plate and provided with an extending spindle slidably received with the open center of the shank and with a projecting rib, a rubber band inserted between the face plates and surrounding the ribs, a pipe having a hollow square center disposed at an angle to the shank and having the inner end thereof socketed in the shank, an adjusting bolt located at the outer end of the pipe, and having the inner end squared to fit the interior opening in the pipe, an adjusting nut mounted on the bolt and engaging normally with the outer end of the pipe, a roller contained in the shank immediately adjoining the juncture of the shank with the pipe, and a cable connecting the inner end of the bolt with the spindle, said cable passing around the roller, as and for the purpose specified.

* * *

No. 158,940.

The Coffield Motor Washer Company, assignee of Peter Coffield and James L.



Fountain.

Coffield, all of Dayton, Ohio, U.S.A., 17th November, 1914; 6 years. Filed 13th July, 1914. Receipt No. 241,224.

Claim.—1. In a device of the character specified, a casing having a main water inlet and an upper and lower discharge openings, and a valve member mounted therein actuated by the water pressure and adapted to control the passage of water through one of the other of said discharge openings according to the force exerted thereon by the water.

2. A drinking fountain adapted to be permanently attached to a water faucet and comprising a shell having an internal boss provided with horizontal and vertical openings communicating one with the other, a drinking tube communicating with the vertical opening, and a fluid actuated valve controlling the water passage to said drinking tube and

(Continued on page 56.)

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

How Is the Water Seal of a Trap Defined?

Editor Sanitary Engineer.—I have often heard and read that certain size traps should have a certain depth of seal. Can you clearly define what constitutes the depth of seal?

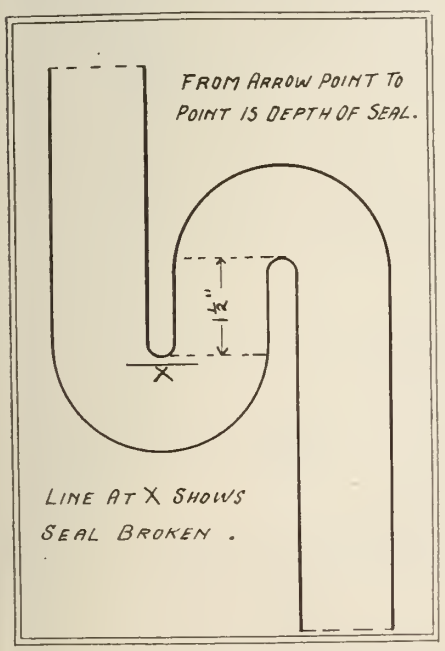
TRAPS.

The depth of seal is determined by measuring the depth of water which would be held in a trap from the water level to a point below in the interior of the trap which would allow air to pass through from the fixture to the waste pipe on the sewer side of trap. See sketch below.—Editor.

* * *

Water Does Not Always Boil at 212 Degrees Fahr.

Editor Sanitary Engineer.—I was always under the impression that water



boiled at 212 degrees irrespective of locality, but have been told that in some parts water is known to boil at a much lower temperature. Could you give me any information upon this matter in your next issue of The Sanitary Engineer.

STEAM ENGINEER.

Below we show part of a table which will be found to answer our reader's purpose. It is compiled by C. B. Thompson and goes to show that water boils at various temperatures.

Locality.	Elevation in feet, above sea level.	Boiling point of pure water, deg. Fahr.	Gauge pressure to give 212 deg. Fahr., lbs., oz.*	Temperature of steam at 2 lbs. per sq. inch gauge pressure.	Normal Barometric pressure inches of mercury.	Normal atmospheric pressure per sq. inch, lbs.
Atlanta, Ga.	1,000	210.0	9	216.9	28.88	14.88
Buffalo, N.Y.	600	210.8	5	217.5	29.33	14.40
Carson, Nev.	4,660	203.0	2.6	210.7	25.12	12.33
Chicago, Ill.	600	210.8	5	217.5	29.33	14.40
Cincinnati, O.	500	211.0	4	217.5	29.44	14.46
Denver, Col.	5,279	201.9	2.11	209.7	24.53	12.04
Leadville, Col.	10,190	192.9	4.12	201.9	20.34	9.98
Pike's Peak, Col. ...	14,108	185.9	6.02	196.0	17.52	8.60

*To give a temperature equal to 2 lbs. pressure at sea level (the basis on which boilers are), add 2 lbs. to the figures given in the third column.

It might be well to state that all boiler ratings are based on sea level, which is the altitude at which water does boil at 212 degrees.

*To give a temperature equal to 2 lbs. pressure at sea level (the basis on which boilers are) add 2 lbs. to the figures given in the third column.

It will be seen that because Pike's Peak is 14,108 feet above the level of the sea, water will boil there (atmospheric pressure) at about 186 degrees temperature, while Cincinnati being only 500 feet above sea level, water boils at 211.0 degrees.—Editor.

* * *

Who Manufactures the Quinn Valve and the Miller Syphon Valve?

Editor The Sanitary Engineer.—Can you give us the address of makers or selling agents if any, of the Quinn valve for septic tanks, also the Miller valve for same as described in your issue of February 1st.

Currie & Murnaghan,
82 Queen street.
Charlottetown, P.E.I.

The manufacturers of the Quinn valve for septic tanks are: Messrs. National Equipment Co., Ltd., Wabash Ave., Toronto. The Miller valves are manufactured by the Pacific Flush Tank Co., 108 South La Salle street, Chicago.—Editor.

* * *

How to Clean a Water Gauge Glass on Steam Boiler.

It is not necessary to take a water gauge glass out to clean it. It may be cleaned as follows:

First.—Draw about a cup full of hot water from the boiler and mix into it a couple of teaspoonfuls of raw muriatic acid (spirits of salts), see that there is not less than one (1) lb. of steam on.

Second.—Close both the gauge cocks.

Third.—Open the top gauge cock and then the pet cock at the bottom of the glass, thus blowing out all the water. Now close the top gauge cock and hold the acid solution in the cup up to within

about half an inch of the pet cock, submerging same. This will create a vacuum and the acid solution will be drawn up into the gauge glass.

Keep the pet cock submerged in the acid solution, and slightly open the top gauge cock, just sufficient to break the vacuum. Keep on repeating the operation until the glass is clean, then thoroughly rinse the acid out. This is far better than taking a gauge glass out, which not only prevents breakage, but also results in keeping a cleaner gauge glass.

* * *

How Can This be Remedied?

Editor The Sanitary Engineer:

We are having a lot of trouble with redness and muddiness in the water from a range boiler. Can you give us a remedy?

Trouble to be remedied, if possible, is the redness and rusty muddiness of the water from hot water boiler. The water has been let off frequently from tap Y near boiler and tap Z at stove in the hope of draining off some of the sediment. This, while helping a little, does not cure the trouble, and the hot water is still red, especially when very hot. The town water contains some iron, but is quite clear and colorless at the cold water tap. When tap Z at stove was being put in, the plumber, in taking pipes apart, found a good deal of rusty deposit in the hot water front in stove. Next door neighbor, on same line of water, with same make of range, has no trouble like this at all. His boiler is nearer stove than ours, but his bath is upstairs. The boiler was emptied and flushed out last March and last November. G. H. G., Ontario.

Fig. A shows a sketch of the layout submitted by G. H. G. It will be seen that there are two dead ends in the line of circulation. No range boiler connection should be made in this manner, because any deposit is sure to fill up these ends and, not only so, but the rust or dirt will be kept moving to some extent, as the water flows by them when circulating.

Another very bad feature about the connection is that both pipes are about equal in length, and are too level. Fig B shows a suggestion which no doubt will cure the trouble. It will be seen that the lower pipe drops, and in that way gives preference in the flow to the top pipe. What is taking place, too, is that the water in the water front gets very hot, and, on account of the sluggish connections, does not circulate. The writer has seen the very same trouble with a coil heater in a furnace. Where both the flow and return pipes have been a little too level, and of equal length, all that has been done to cure the trouble is to form a trap and eliminate all dead ends. The tap shown in Fig. B may be connected at X, if desired, providing X be made the lowest point.—Editor.

* * *

THE BRITISH THERMAL UNIT.

One B.t.u. is the quantity of heat required to raise the temperature of one pound of water one degree. As a gallon of water weighs 8 1-3 pounds, it requires 8 1-3 B.t.u. to raise the temperature of one gallon one degree, or 16 2-3 B.t.u. to raise the temperature two degrees, and so on.

Thus, when a given coal is said to have a heat value of 13,800 B.t.u. per lb., it is meant that if all the heat caused by the complete combustion of one pound of that coal could be transmitted to 13,800 pounds of water it would raise the temperature of that water one degree. Or, if all the heat could be transmitted to, say, 138 pounds of water, it would raise the temperature of that water just 100 degrees, because

$$138 \times 100 = 13{,}800.$$

The pound of water heated multiplied by the number of degrees the temperature has been raised equals the number of B.t.u. The standard method of finding the heat value of a fuel is to burn a small sample of it in a tight steel bomb under water. The heat caused by the burning of the sample is then all absorbed by the water and by multiplying the weight of the water by its rise in temperature and dividing by the weight of the sample, the heat value of the coal is calculated direct in B.t.u. per pound. Thus, if we burned a small sample weighing one five-hundredth of a pound in a bomb immersed in 5 lb. of water, and if the temperature of that water increased from, say, 70.4 degrees to 75.92 degrees, a rise of 5.52 degrees, the heat value of the coal would be

$$\frac{5 \times 5.52}{0.002} = 13{,}800 \text{ B.t.u. per lb.}$$

—Valve World.

* * *

Who Makes Miller Syphon Valves?

Editor the Sanitary Engineer.—In your issue of The Sanitary Engineer, dated March 1st you have a cut showing a Miller automatic syphon used in connection with a septic tank.

Will you please advise me on enclosed post card where the Miller automatic syphon can be purchased, and oblige.

John M. Wilson,
Architect and Appraiser,
Collingwood.

The Pacific Flush Tank Co., 108 South La Salle street, Chicago.—Editor.

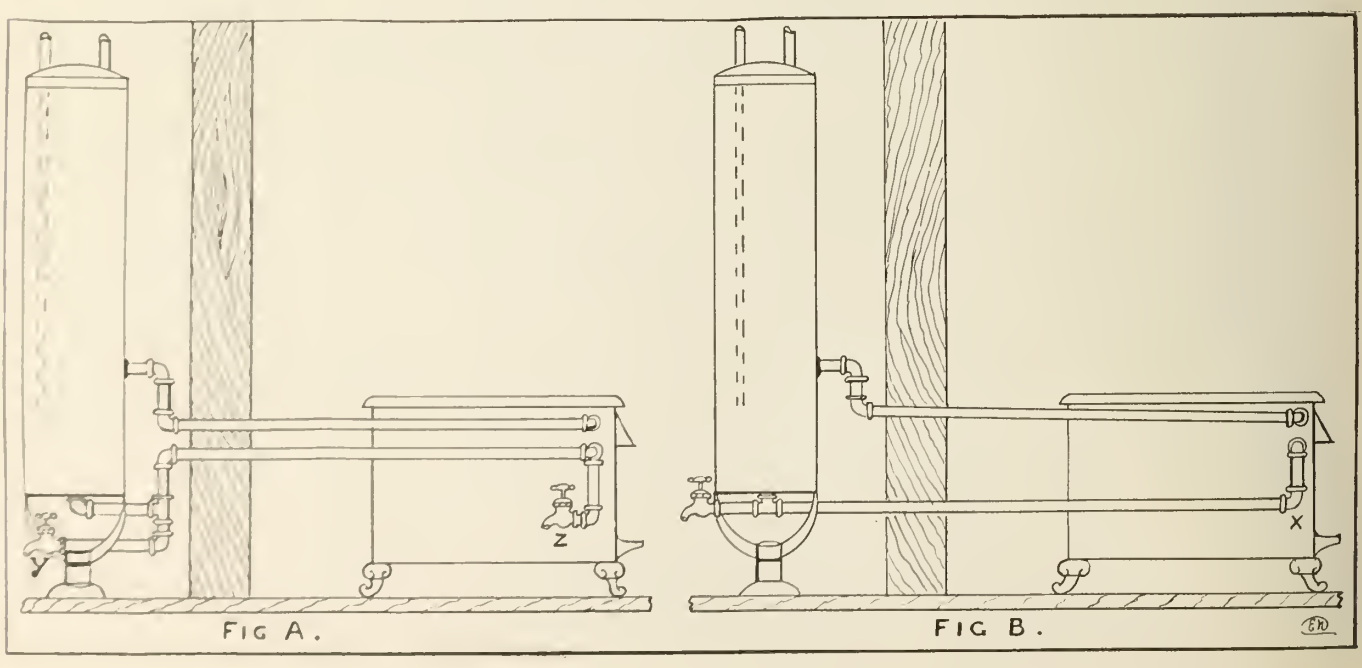


FIG A. FIG B.

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with adjustable bar hinge and open back and front seat. Vitreous china syphon jet bowl.

A perfect outfit for school, factory or any public toilet. We guarantee our flush valves under all conditions when properly installed and we have a full range of combinations sufficient to allow of a selection for any service or building.

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The vitreous china low-down tank makes the ideal tank for the private residence. It matches in color the rest of the bathroom fixtures, and is easily kept clean and sanitary.

We make a large range of tank combinations of every description and in any wood, and if required are prepared to match perfectly the woodwork of any room if a sample is supplied us.

Write for particulars.

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Manufacturers of and Dealers in Plumbers' and Steamfitters' Supplies of All Kinds

SOLDER TO MELT AT 160 FAHR.

Editor Sanitary Engineer.—Can you inform me through the Sanitary Engineer what mixture I would require to make an alloy or solder which will melt at about 160 degrees Fahr., also what the cost would be.

A Reader.

The following is the formula for alloy required. Bismuth 38.4, lead 30.8, tin 15.4, and cadmium 15.4.

Cadmn is worth 3.00 per lb.

Bismuth is worth 4.50 per lb.

Tin is worth 0.57 per lb.

Lead is worth 0.06 per lb.

To buy this alloy ready mixed would cost about $2.50 per lb.—Editor.

SIMPLIFIED SANITARY ENGINEERING METHODS.

(Continued from page 41.)

"Well, why was I not told to arrange my plumbing differently, so as to overcome the installing of long waste pipes and vents?"

Fig. 1 shows another evil which could be remedied very easily, where a battery of w.c.s are being installed the depth between the floor and the vent at the foot of the vertical piece should be as short as possible.

The writer saw, a battery of either 18 or 20 w.c.s installed as shown. The distance from floor to bend was out of all reason and would require a vent for every w.c., which of course was furnished in this particular case, but had the battery been installed as shown in Fig. 2, individual venting would not have been necessary. Upon inquiring why the w.c.s were being installed as shown in Fig. 1, the plumber replied that it was on account of an existing drain from the street being away down. Such an explanation of course, was to say the least, ridiculous, as it would have been far better to have had the main horizontal drain nearer the surface, and an offset made as shown in Fig. 2.

We should be very pleased to have our readers use the pages of The Sanitary Engineer oftener by writing of their experiences from time to time. It is only by exchanging views that real, practical progress can be made.

NEW CANADIAN PATENTS.

(Continued from page 52.)

to said lower opening, said valve normally closing the lower opening and establishing a communication with the drinking tube.

3. In a device of the character specified, a casing having a main water inlet and outlet and a jet for drinking purposes, and a fluid actuated duplex valve member adapted to normally close the main outlet and maintain a communication with the drinking jet, the position of said valve member depending upon the force of the incoming water.

4. In a device of the character specified, a casing having a main water inlet and outlet and a jet for drinking purposes, and a valve member adapted to normally close the main outlet and to maintain a communication between the main inlet and said drinking jet, said valve member having an annular shoulder against which the water impinges to reverse said valve member when the force of the water exceeds the weight of said valve member.

5. In a device of the character specified, a casing having a main water inlet and outlet and a drinking jet, a valve member having an enlarged portion lying within the entrance to the drinking jet and providing an annular passage therearound and an annular shoulder therebelow, said valve member being adapted to normally close the main outlet and maintain a communication between the drinking jet and the inlet and to be reversed when the force of the water exceeds the weight of said valve member.

6. The combination with a valve casing having a low pressure discharge opening and a high pressure discharge opening, of a duplex valve normally closing the high pressure opening and adapted to close the low pressure discharge opening when actuated by the fluid pressure.

W. G. Foster Appointed Manager of Canadian Wolverine Co., Ltd.

Chatham, Ont.—Charles S. Cornelius, who has been manager of the Canadian Wolverine Company, Limited, since its establishment here in 1907, is leaving shortly for southern California, where he will reside, the change being necessitated by his health. He is succeeded as manager of the company by W. G. Foster, who has for some years been secretary-treasurer.

Opened New Branch.

W. C. Beattie, formerly with the Canadian Johns-Manville Co., has been appointed sales manager at Ottawa, the new branch office of the C. A. Dunham Co. Steam Specialty Manufacturers, Toronto.

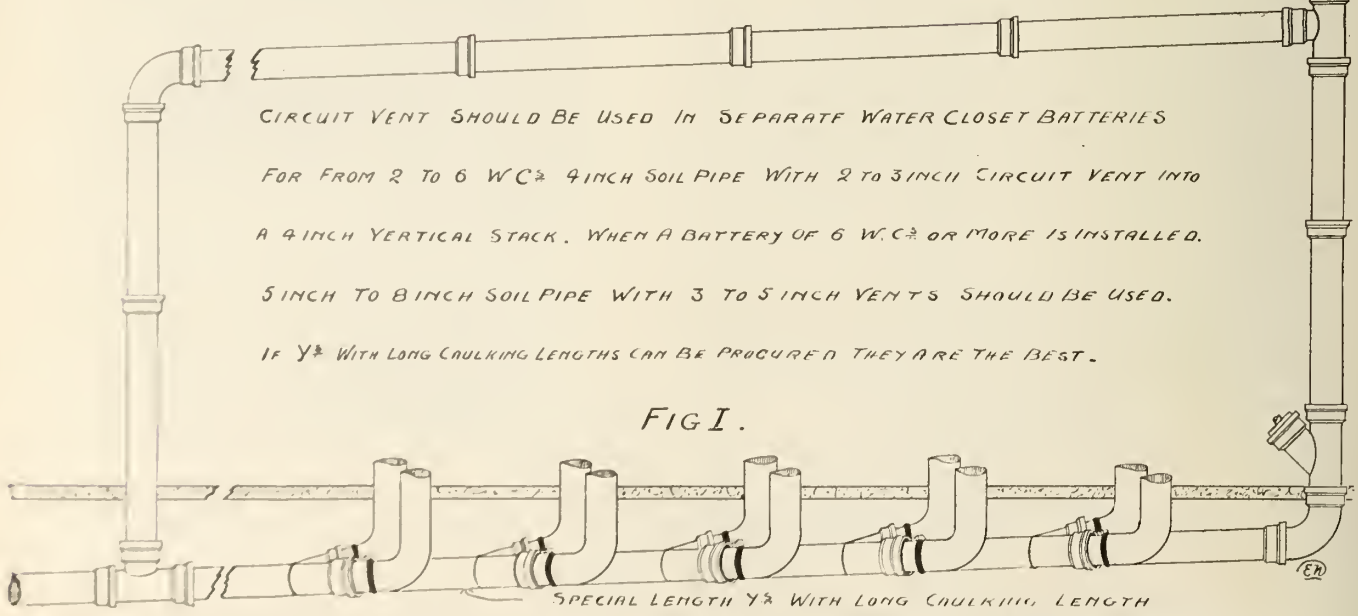
CIRCUIT VENT SHOULD BE USED IN SEPARATE WATER CLOSET BATTERIES
FOR FROM 2 TO 6 W.C.s 4 INCH SOIL PIPE WITH 2 TO 3 INCH CIRCUIT VENT INTO
A 4 INCH VERTICAL STACK. WHEN A BATTERY OF 6 W.C.s OR MORE IS INSTALLED.
5 INCH TO 8 INCH SOIL PIPE WITH 3 TO 5 INCH VENTS SHOULD BE USED.
IF Y's WITH LONG CAULKING LENGTHS CAN BE PROCURED THEY ARE THE BEST.
SPECIAL LENGTH Y'S WITH LONG CAULKING LENGTH

FIG I.

Place a full Y and cleanout at the outlet of drain, and allow a fall to the main sewer, instead of running every individual W.C. waste vertically as shown on page 41.

Quick Hot Water at a Big Saving — of Gas —

One minute after the

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is lit it gives hot water at the tap

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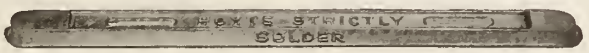

We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

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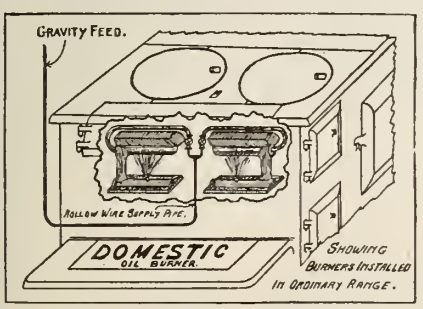

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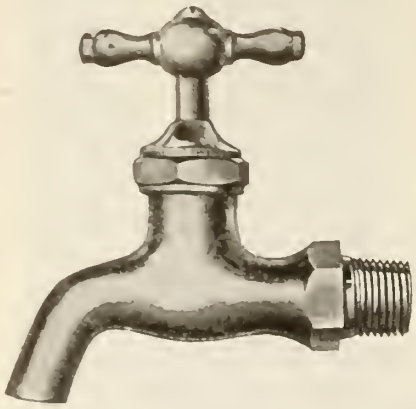

Furnished with Tee Handle as per cut and with Brass or China Index Lever Handle.

Spout has proper angle to throw the water outward into Dish or Pail, no matter how close to wall or sink back the bibb is installed.

Swivel stem insures long life to washer, as it cannot grind on seat.

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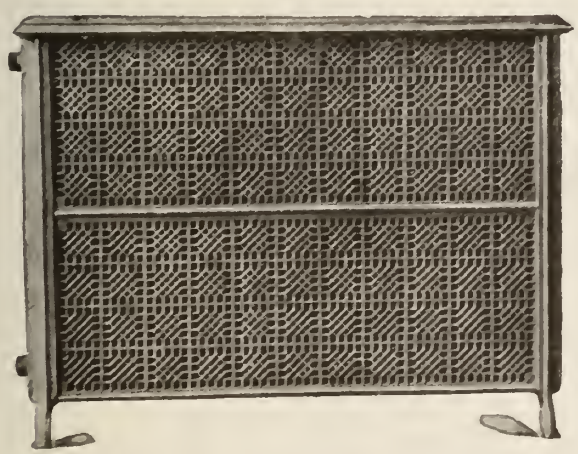

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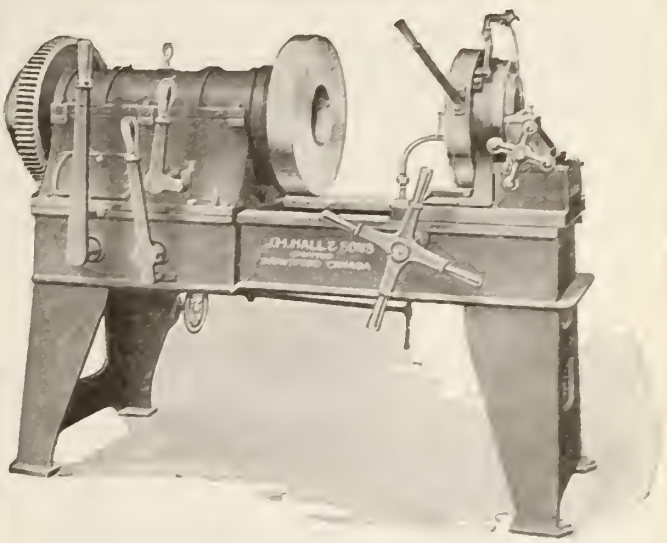

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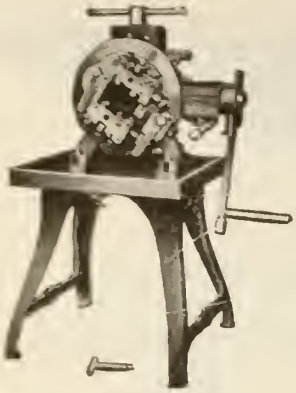

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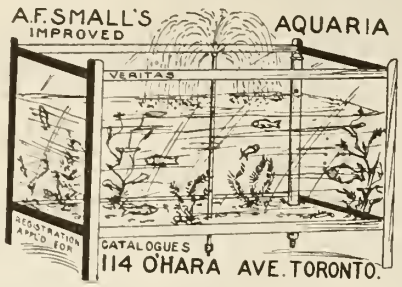

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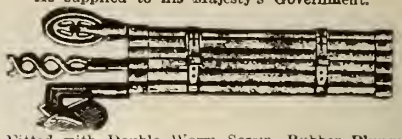

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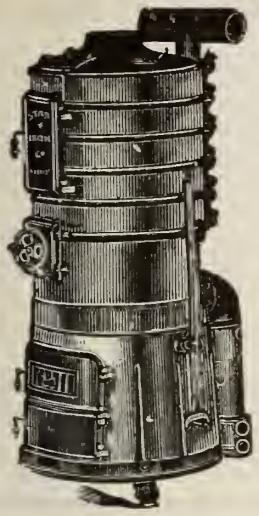

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The "New Star"

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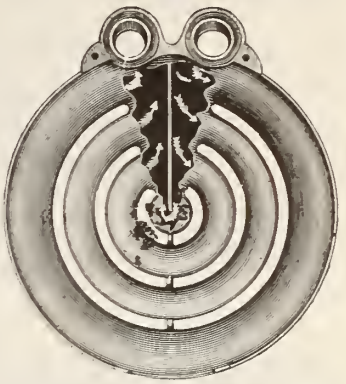
The most improved on the market. The only Heater having a *Tubular section* giving one-third more heating capacity than any Flat Section Heater, and dividing the water, making it easier heated.



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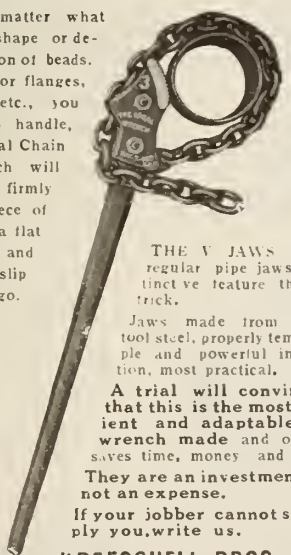
Grips ANYTHING on the job.

No matter what size, shape or description of beads, valves or flanges, caps, etc., you have to handle, the Ideal Chain Wrench will grip as firmly as a piece of pipe or a flat surface, and **never** slip or flet go.



THE V JAWS between the regular pipe jaws is the distinctive feature that does the trick.

Jaws made from high-grade tool steel, properly tempered, simple and powerful in construction, most practical.

A trial will convince you that this is the most convenient and adaptable chain wrench made and one that saves time, money and labor.

They are an investment and not an expense.

If your jobber cannot supply you, write us.

KROESCHELL BROS.
475 W. Erie St.
CHICAGO

Service—Responsibility

THIS emblem stands for over half a century's progress, achievement and business integrity. It stands for a new order of service—service that concerns itself with your problems and their solution, with your customers and their satisfaction—a service that is as responsible in fact as it is in name because it is backed up by J-M Responsibility.

The CANADIAN H. W. JOHNS-MANVILLE CO. LIMITED

Manufacturers of J-M Washerless Faucet, J-M Asbestos Lead Joint Runner, H-O Pipe Joint Cement, J-M Pipe Coverings, J-M Leak-No Metallic Compound, J-M Sanitor Drinking Fountain.

Write nearest Branch for booklets. 3084

TORONTO MONTREAL WINNIPEG VANCOUVER

WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal

Williams Chain Pipe Tools

are guaranteed to provide for unusual service and you will never go wrong if equipped with them for any work in their line. No substitute ever has or will serve you as thoroughly and as often.

Improved "Vulcan"
Double Ended Reversible Jaws. "Two Tools in One at the Price of One" for Pipe Work.

"Agrippa"
with Single Jaw and Flat Chain, an excellent tool for close-quarters in Pipe and Fittings work.

Send for Pipe Tools Pamphlet

J. H. WILLIAMS & CO.
Superior Drop-Forgings
77 Richards St., Brooklyn, N.Y.

Branch Factory
Buffalo. N.Y.

Messrs.
BRUNNER, MOND & Co., ENGLAND,
Have the finest Industrial Bath Installation in Europe.

OVER 2000 EMPLOYEES
are provided for.
This is the Valve used.

Made in England
by GUMMERS Ltd.,
ROTHERHAM

THE DUAL VALVE
IS THE FINEST MIXER YET PRODUCED

This Mixer is strong and well built.

It can be taken to pieces without disturbing connections. Made in various types for Baths, Lavatories, etc.; also special stock pattern with one or two outlets at option for making up sets.

Send for booklet to

Geo. Carpenter,
314 University St.,
Montreal
Canadian Agent

The Manny Geyser

AUTOMATIC WATER HEATER

Fully Guaranteed

is composed of a vertical cylinder from four to six feet long, according to size. The cylinder contains brass pipes which receive the steam and transmit heat to the water. These pipes are screwed to the base chamber, but remain independent from one another at the top; consequently, the expansion is entirely free, and leaks are impossible.

WRITE TO-DAY FOR FULL PARTICULARS

The E. S. Manny Company **Montreal**

R. E. CLEATON CO., 28 St. Nicholas St., Montreal—Sales Agents

P H LAPWELD PIPE

MADE IN SIZES
FROM
2 Inches to 10 Inches

THE ONLY
LAPWELD PIPE
MADE IN CANADA

Note the Brand which appears in raised letters every four feet along each length of pipe.

This Brand is a positive guarantee of excellence, and any pipe bearing the Brand which is found defective will be replaced free of charge.

PAGE-HERSEY IRON, TUBE & LEAD CO., Limited

TORONTO, ONTARIO

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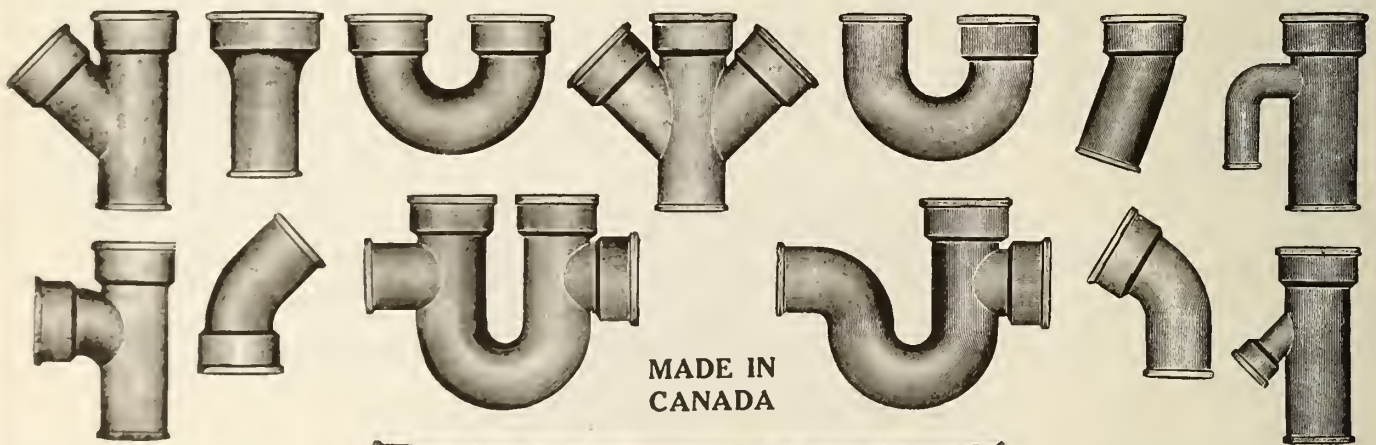
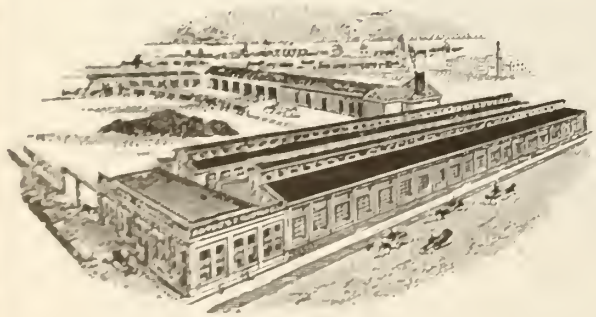


MADE IN CANADA

ANTHES FOUNDRY LIMITED

TORONTO PLANT

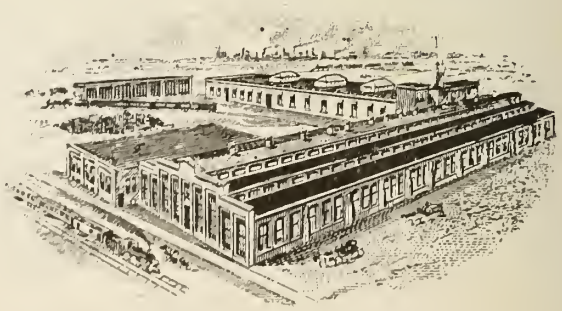
WINNIPEG PLANT



TORONTO and WINNIPEG

MANUFACTURERS OF

High-Grade CAST IRON SOIL PIPE AND FITTINGS



When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."

WHY NOT BUY

Pipe Fittings

Made in Canada

Specify M Fittings—Use M Fittings

RECESSED DRAINAGE FITTINGS

MALLEABLE FITTINGS

With this brand mean fittings made of Air Furnace Refined Iron, reamed and tapped to gauge with perfect threads.

M

CAST IRON FITTINGS

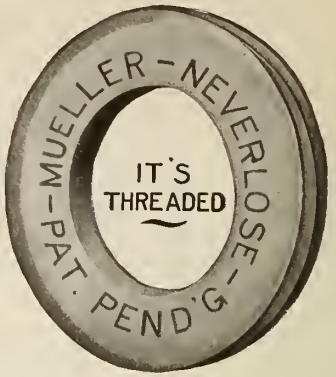
With this brand mean fittings made with Iron of high tensile strength—proper proportions and correct tappings.

Standard and Extra Heavy Flanged Fittings and Flanges, Galvanizing Malleable and Gray Iron Castings of all Kinds

International Malleable Iron Co., Limited

GUELPH, ONTARIO

MUELLER NEVER LOSE Hose Washer



Every user of garden hose wants it. Sells on sight.

It can't loose out of the coupling because the thread of the washer meshes with thread of coupling. An advantage so plain that every one recognizes it instantly.

HANDSOME SHOW-CASE CARD

Brings this useful little article to the attention of the trade. Place your order now. Get in position to take care of the spring trade. No trouble to make sales. Every sale opens the way to new business. Clip and mail coupon. Do it now.

Made in Sarnia, Canada

H. Mueller Mfg. Co., Limited

SARNIA, ONT., CANADA

Makers of High-Grade Water, Plumbing and Gas Brass Goods.

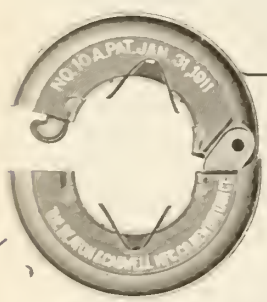
S.E.

H. Mueller Mfg. Co., Ltd.
Sarnia, Ont.

Send me free sample of Never-Lose Hose Washer and prices.

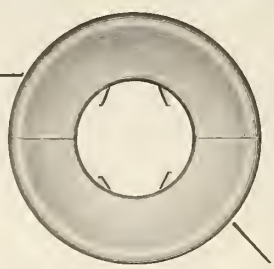
Signed ....

City .....Prov. .....



OPEN VIEW NO. 10-A.

The CEILING PLATE that's better



TOP VIEW NO. 10-A.

THE NO. 10—A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ⅜" WIDE. HIGHLY FINISHED. ESPECIALLY DESIGNED FOR IRON CONNECTION.

The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and risers at the very last, and is not exposed during completion of a building.

High quality at the right price.

GEM NO. 4

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

Write for catalog showing our complete line of specialties.

The BEATON & CADWELL MANUFACTURING Co.

New Britain, Conn.

[illegible] J. B. Devereux, 142 St. Joseph Boulevard West, [illegible] Agent: A. E. Hinds & Co., Chamber of Commerce, Winnipeg.

NOTICE

TO STEAMFITTERS

All steam boilers to be used in the Province of Ontario for heat and power purposes must be constructed from a design registered in the Steam Boiler Branch of the Department of Public Works, and must be accompanied by a certificate issued by the Department showing that the boiler has been built to conform with the Steam Boilers Act. Boilers used in a private residence, apartment house, office building, church, hotel or public building, used exclusively for heating purposes, are exempt provided that they are fitted with a safety valve which has been registered, limiting the pressure carried to fifteen pounds, and having an area figured in accordance with Section 107 of the Regulations.

Plans showing the lay-out of all high pressure steam lines, with valves, etc., must be submitted to the Department for approval in the same manner as boiler designs.

For further information address the Steam Boiler Branch, Department of Public Works, Parliament Buildings, Toronto.

Hon. Finlay G. Macdiarmid, Minister of Public Works. D. M. Medcalf, Chief Inspector of Steam Boilers.

Kindly mention this paper when writing to advertisers.

Classified Buyers Guide

Occasionally advertisements are inserted in the paper after this page has gone to press. The insertion of the Advertiser's name on this page is not part of the advertising order, but is inserted solely for the convenience of the reader of the paper.

Asbestos Goods.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Air Line Systems.
C. A. Dunham & Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
C. A. Dunham Co., Ltd., Toronto.
Gurney Foundry Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Jenkins Bros., Ltd., Montreal.
Kerr Engine Works.
Steel & Radiation Co., Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Boilers, Steam or Hot Water.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Toronto.
Warden King Co., Ltd., Montreal.

Boiler Feed Regulators.
C. A. Dunham Co., Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, Etc.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Johns-Manville Co., Ltd., Toronto and Montreal.
Dunham, C. A., Toronto.
Empire Brass Mfg. Co., London.
James Morrison Brass Mfg. Co., Toronto.
Jenkins Bros., Ltd., Montreal.
H. Mueller Mfg. Co., Sarnia, Ont.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., Toronto.
Tallman Brass & Metal Co., Hamilton.
James Morrison Brass Mfg. Co., Toronto.

Cellar Drainers.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.
Penberthy Injector Co., Ltd., Windsor, Ont.

Closets.
Amherst Foundry Co., Amherst, N.S.
Empire Brass Mfg. Co., London.
Galt Brass Co., Galt.
B. O. T. Manufacturing Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Johns-Manville Co., Toronto.
Standard Sanitary Mfg. Co., Toronto.

Correspondence Schools.
Anglo-American Sanitary School.

Country Residence Equipments.
Empire Brass Mfg. Co., Ltd., London.
General Machinery Co., Ltd., Mulock Ave., Toronto.
National Equipment Co., Limited, Toronto.
Jno. Stevens & Co., Ltd., Winnipeg.

Damper Regulators.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
Empire Brass Mfg. Co., Ltd., London.
Fittings, Limited, Oshawa.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.
Tallman Brass & Metal Co., Hamilton.
Penberthy Injector Co., Ltd., Windsor, Ont.

Ejectors for Sewage.
National Equipment Co., Toronto.

Enamelware.
Amherst Foundry Co., Ltd., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Ltd., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Ltd., Toronto.

Electric Pumping Machinery.
Empire Brass Mfg. Co., Ltd., London.
General Machinery Co., Ltd., Toronto.
National Equipment Co., Ltd., Wabash Avenue, Toronto.

Fittings.
Empire Brass Mfg. Co., London.
Fittings, Limited, Oshawa.
Steel & Radiation, Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., Ltd., London, Ont.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Co., Ltd., Toronto.
Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
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Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
Warden King, Ltd., Montreal.

Garbage Burners.
Gurney Foundry Co., Ltd., Toronto.

Gasoline Engines.
National Equipment Co., Ltd., Wabash Avenue, Toronto.

Gas Mantles.
Hamilton Gas Mantle Co., Ltd.

Gas Water Heaters.
Gurney Foundry Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.

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Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
The E. S. Manny Co., Montreal.
Warden King, Ltd., Montreal.

Lead.
Empire Brass Mfg. Co., London.
Hoyt Metal Co., Toronto.
Tallman Brass Mfg. Co., Hamilton.
James Morrison Brass Mfg. Co., Toronto.

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P. Campbell & Co., St. John, N.B.

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Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
C. M. Kemp Mfg. Co., Baltimore.
Empire Brass Mfg. Co., Ltd., London.
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Galt Brass Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallacebnrg Brass Mfg. Co., Wallaceburg.
Warden King, Ltd., Montreal.

Oil Storage Systems.
National Equipment Co., Ltd., Wabash Avenue, Toronto.

Packing.
Canadian Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
Steel & Radiation, Ltd., Toronto.
Warden, King, Ltd., Montreal.
Steel Co. of Canada, Montreal.
James Morrison Brass Mfg. Co., Toronto.

Pipe Joint Compounds.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.

Pipe Threading and Cutting Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., New Britain, Conn.

Porcelain Ware.
Amherst Foundry Co., Ltd., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
Standard Ideal Mfg. Co., Ltd., Port Hope, Ont.
Standard Sanitary Mfg. Co., Ltd., Toronto.

Pumps.
C. A. Dunham & Co., Ltd., Toron.
National Equipment Co., Toronto.
General Machinery Co., Ltd., Mulock Ave., Toronto.
Cluff Bros., Church St., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Radiators.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn.

Radiator Fittings.
Fittings, Limited, Oshawa.

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National Equipment Co., Ltd., Wabash Ave., Toronto.

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Dart Union Co., Ltd., Toronto.
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Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.
The E. S. Manny Co., Montreal.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
C. A. Dunham Co., Ltd., Toronto, Ont.
E. S. Manny Co., Montreal.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Testing Plugs.
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Armstrong Mfg. Co., Bridgeport, U.S.A.
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Canadian Tap & Die Co., Ltd.
Hall & Sons, Ltd., Brantford.
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Cluff Manufacturing Co., Ltd., Toronto.
James Robertson Co., Ltd., Toronto.

Vacuum Systems of Heating.
C. A. Dunham & Co., Ltd., Toronto.

Water Supply Systems.
National Equipment Co., Ltd., Wabash Avenue, Toronto.
The General Machinery Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Ashdown Hardware Co., Ltd., Winnipeg.

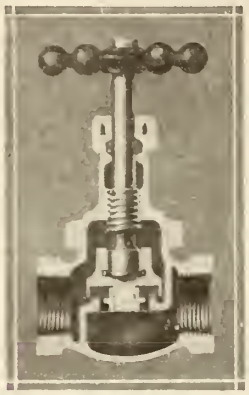
PENBERTHY TRADE MARK

ANOTHER QUALITY LINE

PENBERTHY TRADE MARK

BRASS COMPODISK VALVES

"With the Composition Disc"



"With the External Thread Construction"

The threads on bonnet end of body are on the ontside of valve immune from corrosion, action of water, steam, etc. This construction, which is not found in the ordinary valve on the market, is much stronger than valves having the bonnet screwed into the body, and having found it so much superior in our Regrinding Line of Valves we adopted the same construction in the COMPODISK line. It has many other advantages, viz.: valves always accessible, no straining or stripping of threads when assembling or taking apart; impossible to spread or enlarge body of valve causing a loose-fitting and unsafe bonnet.

We have also embodied in COMPODISK Valves such excellent features as Packing Gland Follower, Special Moulded Graphite Asbestos Packing, Special Designed Hand Wheel fastened with a hexagon nut, etc.

For satisfactory service you will find Penberthy COMPODISK Valves superior to any other composition disc valve on the market.

The Long-Service Disc

The discs used in the COMPODISK Valves are made of special compound of asbestos and rubber scientifically treated, and are of a strength and density so great that they are unaffected by high steam pressures or severe conditions. They are sufficiently elastic to prevent crumbling or flaking and will not become hard or brittle and crack, a fault so objectionable with the majority of discs on the market.

Their record for long and efficient service with engineers throughout the country goes far to establish our claims that COMPODISK Discs will give better and longer service than any other disc on the market.

These discs are standard with other makes as regards size and style, and each bears the trade-mark COMPODISK stamped on it. For best results, specify and insist on getting only discs that bear our trade-mark COMPODISK

Write us for prices

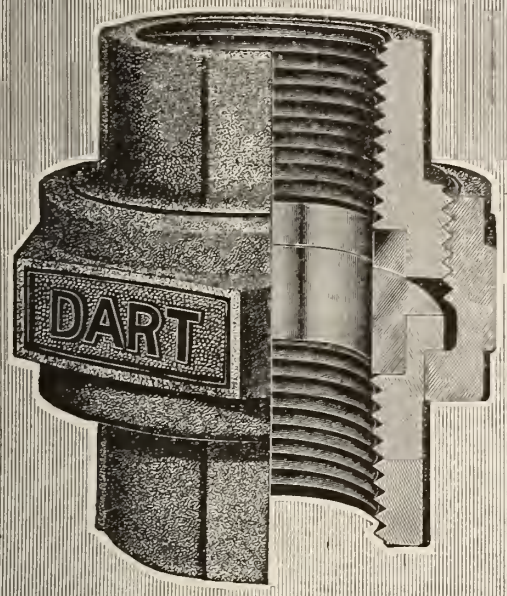
ALSO INTERESTING BOOKLET

MANUFACTURED BY

Penberthy Injector Company, Limited

WINDSOR, ONT.

DART UNIONS



BRONZE TO BRONZE

DART UNIONS MAKE **PERMANENTLY** TIGHT PIPE CONNECTIONS, BECAUSE THE BRONZE FACES CANNOT DETERIORATE AND THE HEAVY IRON PARTS WILL NOT STRETCH OR GIVE WAY.

THE BALL-SHAPED SEAT ALLOWS FOR AN EASILY MADE CONNECTION WHETHER PIPES ARE IN OR OUT OF ALIGNMENT

Specify the "Dart" when placing your next order for pipe couplings with your jobber—it will leave no room for complaints, and save you much time and trouble.

We will promptly replace a Dart Union 2 for 1 if not right.

DART UNION CO., LIMITED
TO ONTO, CANADA

MADE IN CANADA

KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

This plant is at your service.
Help us keep it busy.

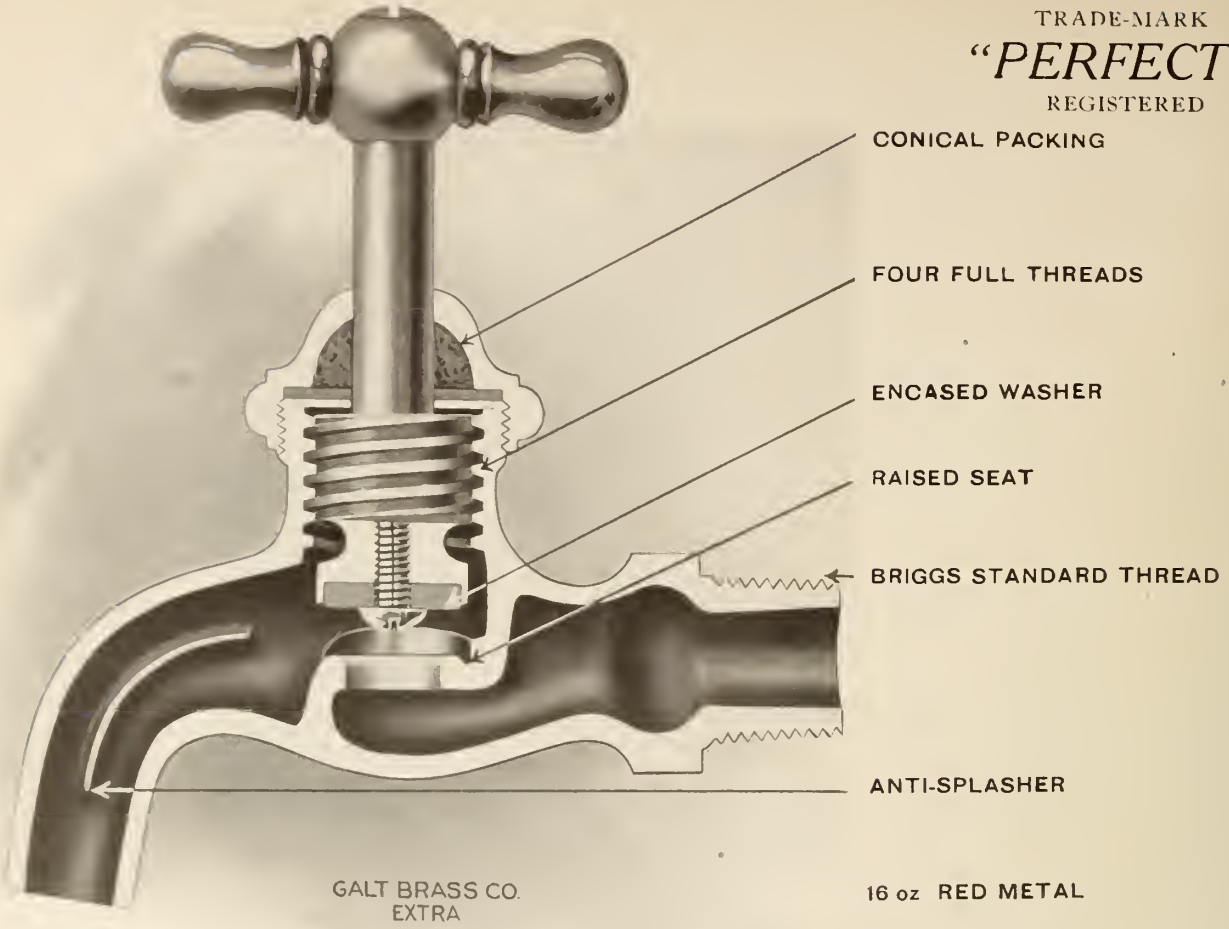
REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

Quickest possible deliveries
Consistent Prices.

Best quality of goods.
Write for Catalog No. 5.

The Kerr Engine Company, Limited Walkerville, Ontario
Valves and Hydrants Exclusively

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all **Quick opening**, having **Double Thread** on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX. Publication Office: TORONTO, APRIL 15, 1915 No. 8

THREE-INCH RIM BATH TUBS

No other style of bath ever has and probably never will rival it for continuous popularity and sale. It was "the" bath of the past—it is still "the" bath of the present.

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"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

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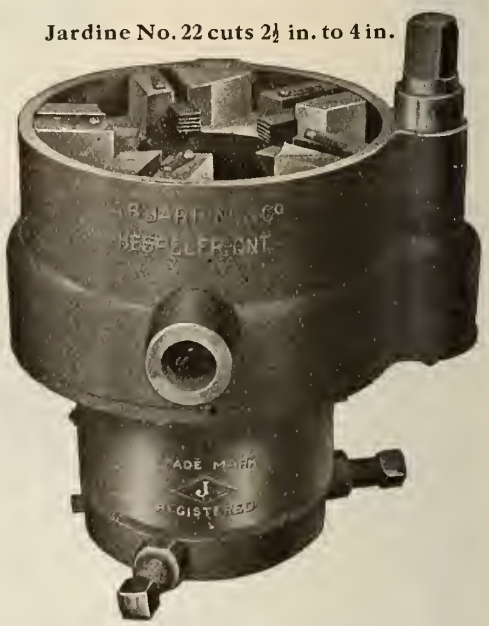

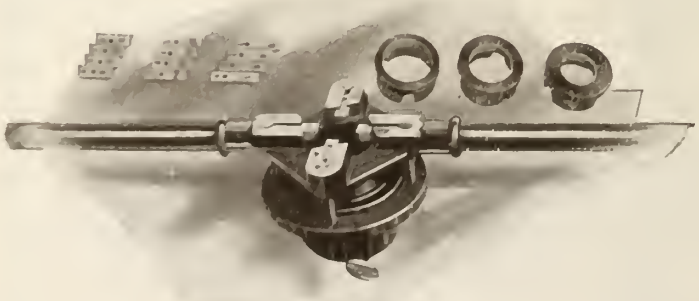

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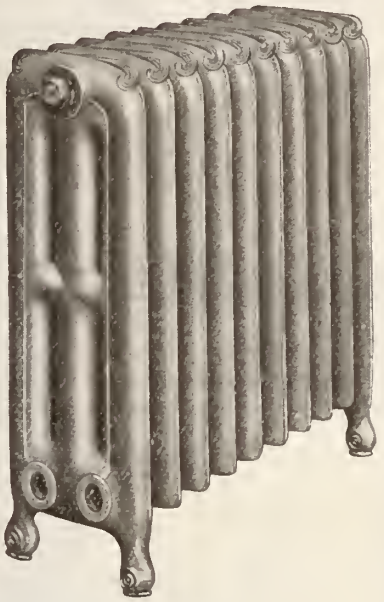

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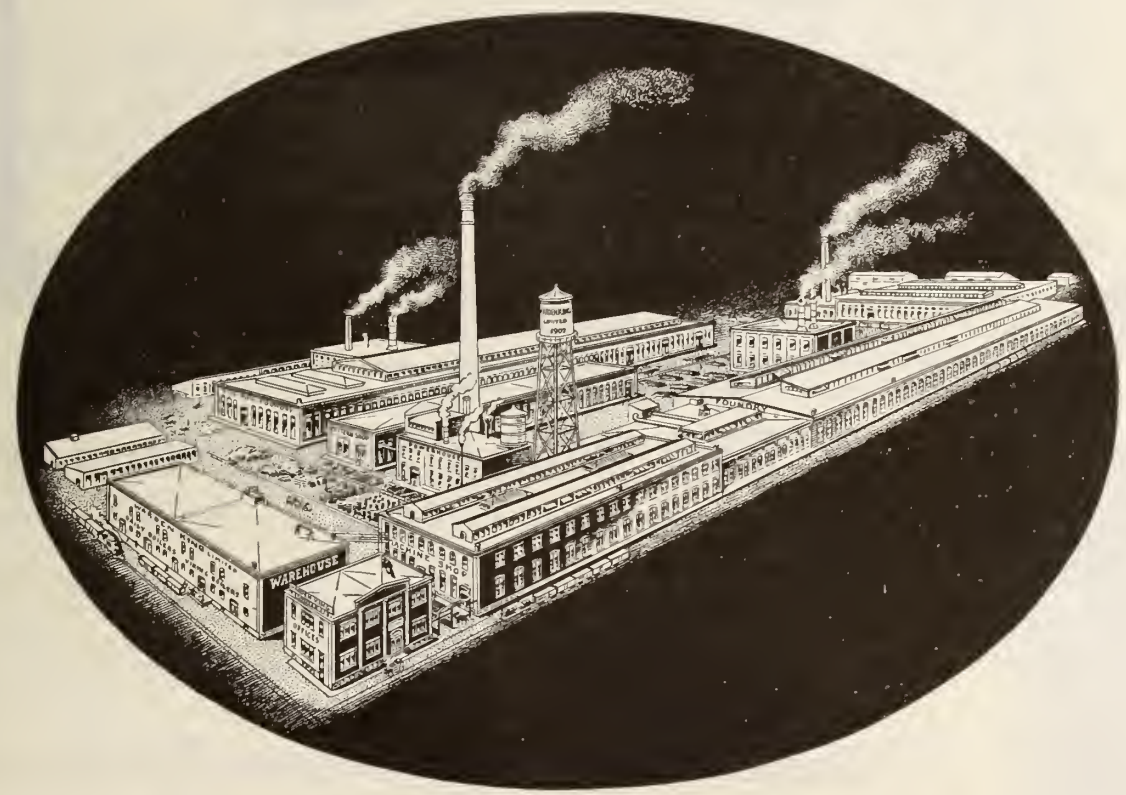

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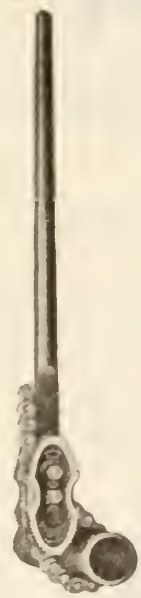

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Improved "Vulcan"
Double Ended Reversible Jaws. "Two Tools in One at the Price of One" for Pipe Work.

"Agrippa"
with Single Jaw and Flat Chain, an excellent tool for close-quarters in Pipe and Fittings work.

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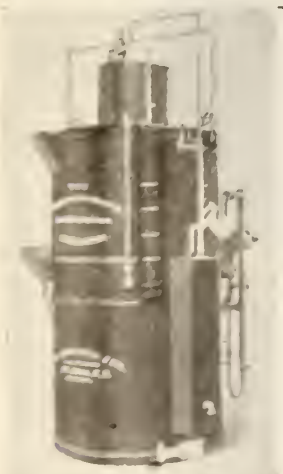

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A new Tank will be given to replace one that at any time proves defective from either material or workmanship.

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No joints to open up nor linings to leak.

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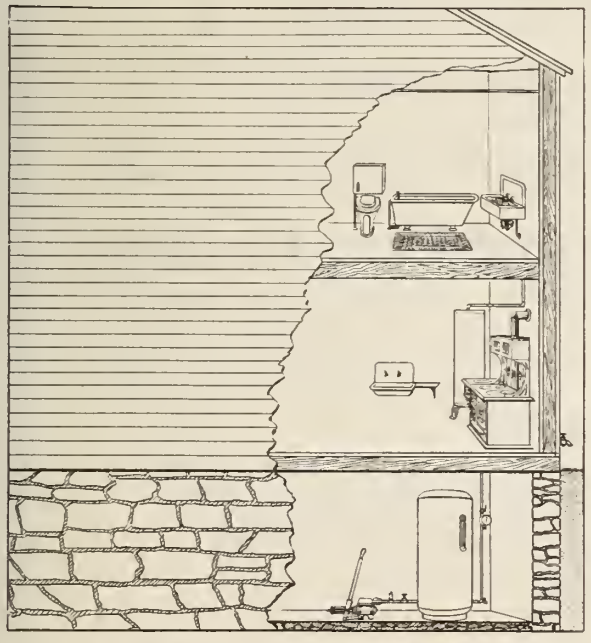
MEAN BUSINESS FOR YOU



You, Mr. Dealer, understand what comfort a sink, a bath room, Hot and Cold water bring to a household.

Now, you can install these comforts in any house—on farm or in town. Never mind the lack of water works. Our hand or power pump outfits give the pressure.

Our prices are right, and will enable you to get both business and profits.

The John Stevens Company, Limited

Dealers in Plumbers' Supplies, Baths, Lavatories, Brass Goods, Soil Pipe, Pneumatic Pressure Systems, Etc.

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SANITARY ENGINEER

PLUMBER and STEAMFITTER of CANADA

Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, APRIL 15, 1915 No. 8

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EDITORIALS

The Mail Order Scheme—Convention Number—Real Patriotism—Heating Engineers to Pass Examination.

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Polished or Nickel Plated

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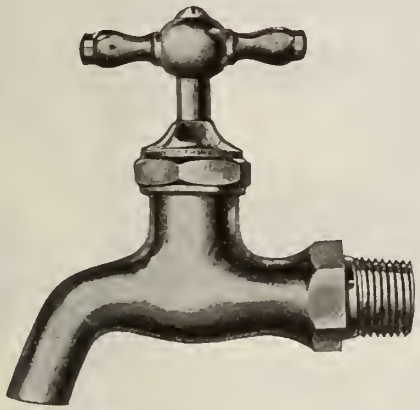

Furnished with Tee Handle as per cut and with Brass or China Index Lever Handle.

Spout has proper angle to throw the water outward into Dish or Pail, no matter how close to wall or sink back the bibb is installed.

Swivel stem insures long life to washer, as it cannot grind on seat.

Positively the best bibb on the market for the price.

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BY THE

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Turning Losses Into Profits

John Doe is a good mechanic. But he used his files too long. Stock-room records showed *low* file-consumption. Labor-cost ran *high* on every job. *Pennies saved* in the stock-room—*dollars lost* in the shop.

Investigation!

John Doe ordered to discard worn files promptly. To stop using inefficient files. Stock-room bought more files. John Doe did more work. In less time. At lower cost. *Pennies invested* in the stock-room—*dollars saved* in the shop.

That—in a nut-shell—is the story of *efficient* filing.

When John Doe saves files — *you lose money*. When he discards worn files promptly —*you make money*. And you make the most net profit when John Doe uses only the "Famous Five":

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
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GLOBE

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Accurately manufactured in 60,000,000 quantities—in 4,000 different patterns—used by 90% of Canada's file-users—the "Famous Five" cut costs.

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Easier and Cheaper
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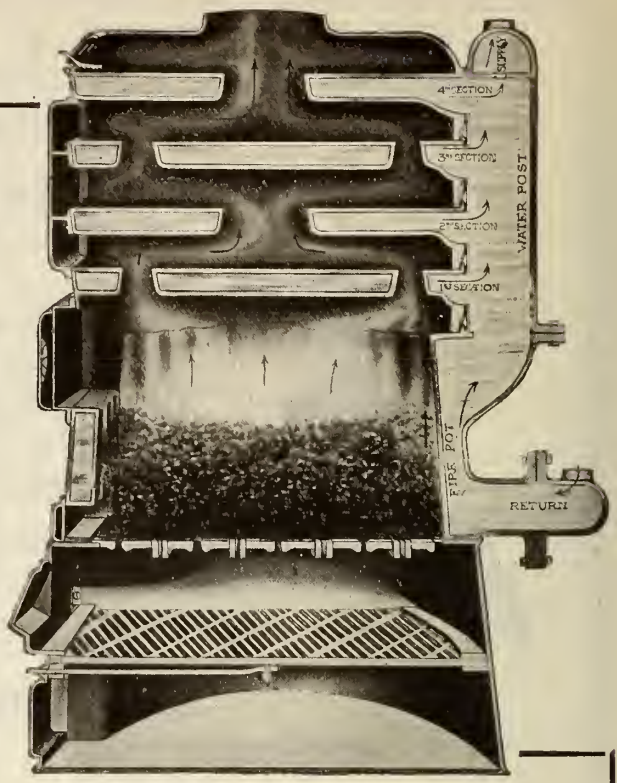
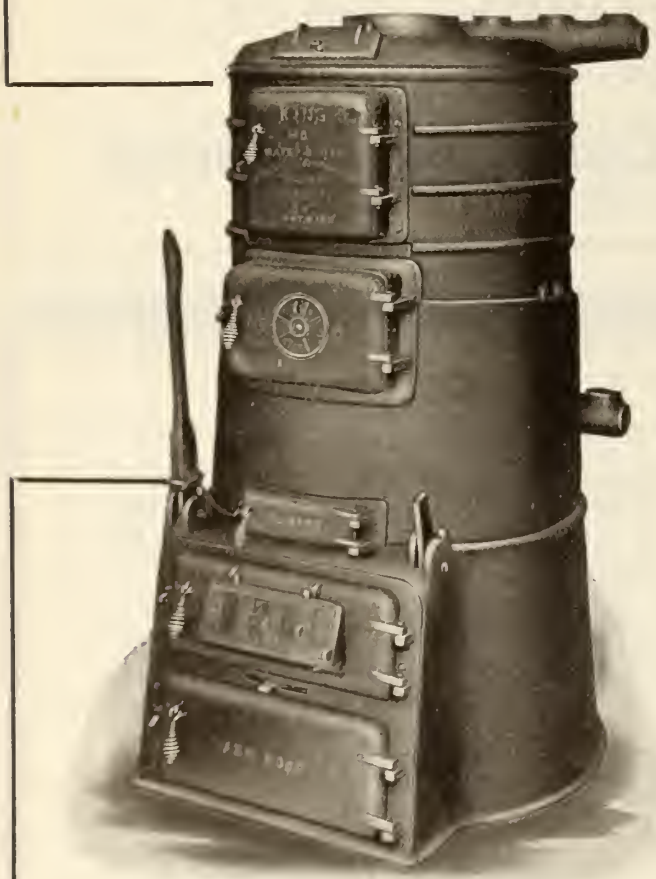


Sectional View "King" Boiler.



No. 6 High Base "King" Boiler with Double Shaker.

It tells the story and explains the *"King"* Boiler from ash-pit to smoke pipe.

We'd like to get together with you on this season's work and show you some of our practical plans for co-operating with you.

Our success as manufacturers depends on your success.

Our Complete Line

Includes—"Royal" Round Steam and Water Boilers.
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"Royal" Water and Laundry Heaters.
"Royal" Smokeless Steam and Water Boilers.
"Royal" Fire-box Steam and Water Boilers.
"King" and Imperial Radiators.

We also carry a complete line of steamfitters' and engineers' supplies.

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THE SANITARY ENGINEER

VOL. IX. APRIL 15, 1915 No. 8

Sanitation and the Mail Order Business

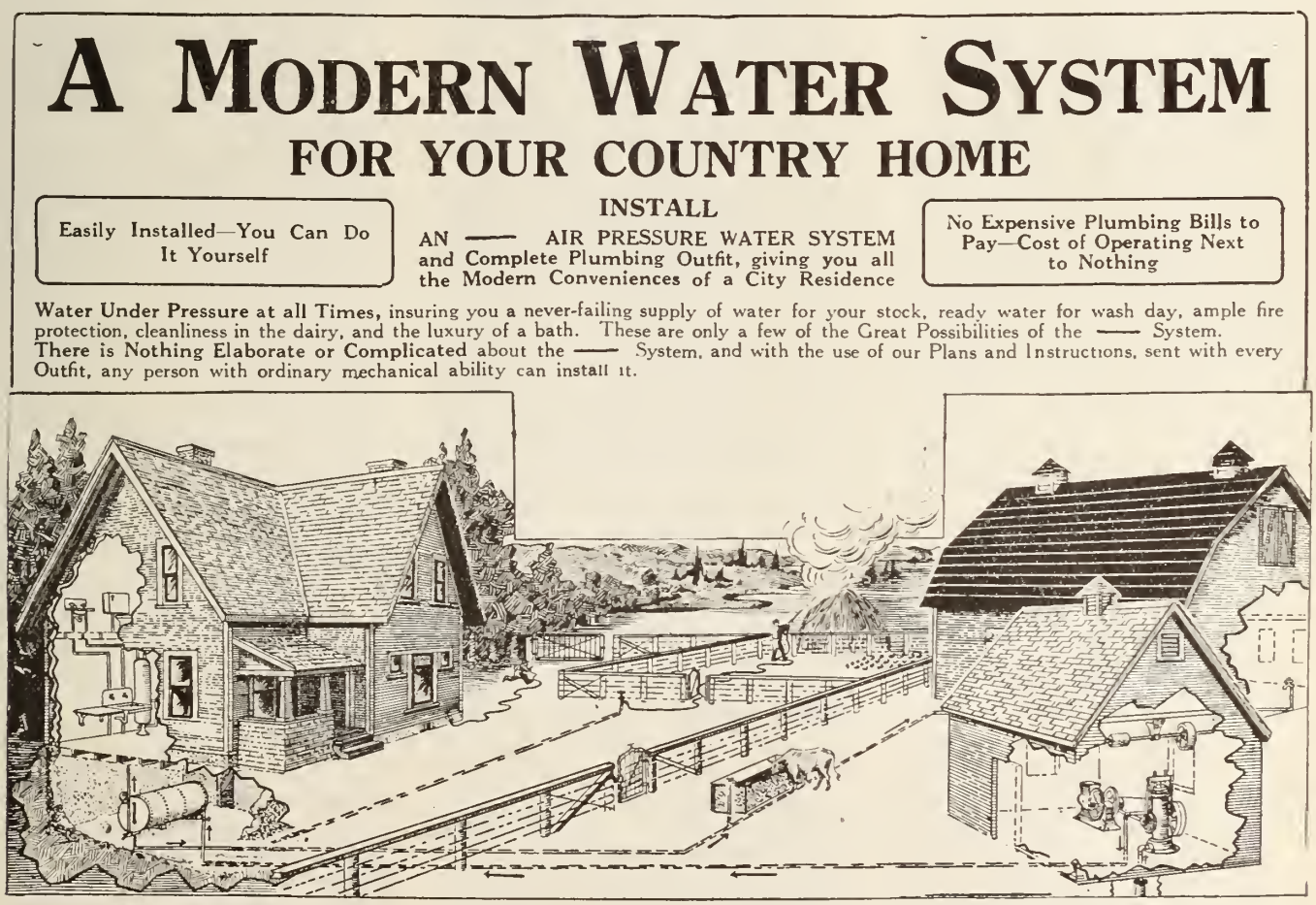
Dangerous Scheme Being Carried on by Mail Order House — Tendency to Pollute Healthy Surroundings—A Mockery Under the Guise of Sanitation—Such Installations Would be Condemned in a City.

ONE of the main cries of the mail order houses in Canada, as well as in other parts of this continent is, that they are established to give service. Service to whom may we ask? And what kind of service?

There is a service being handed out to-day, which has not been given much prominence until recently and that is, the selling of sanitary plumbing fixtures to the rural residents, with plans and other supposedly simple instructions showing how the pipes and fixtures can be properly installed.

First, let us analyze the goods that are foisted upon the people who buy them.

We have examined a whole stock of w.c.'s, baths, lavatories and sinks, which are on sale in a certain mail order house, and after making visits almost daily for months, we have not seen what we should designate as ordinary fair quality, price considered. The mail order house we have in mind, apparently never dreams of buying first-class quality plumbing goods, does not quote them in their various folders they circulate, and does not carry them in stock. These folders which are being mailed to every farmer and rural resident, lead those to whom they are sent to think that the buyers are able to install their own plumbing fixtures, all joints are screwed, etc., and only a little common sense and a pipe wrench is necessary to install all the bathroom and kitchen fixtures necessary for a single home. These mail order houses also claim that they can sell pneumatic water systems ready for installing with a gilt-edge guarantee. They are also trying to gull the innocent public into buying septic tanks, which are de-


A MODERN WATER SYSTEM
FOR YOUR COUNTRY HOME
Easily Installed—You Can Do It Yourself
INSTALL
AN —— AIR PRESSURE WATER SYSTEM and Complete Plumbing Outfit, giving you all the Modern Conveniences of a City Residence
No Expensive Plumbing Bills to Pay—Cost of Operating Next to Nothing
Water Under Pressure at all Times, insuring you a never-failing supply of water for your stock, ready water for wash day, ample fire protection, cleanliness in the dairy, and the luxury of a bath. These are only a few of the Great Possibilities of the —— System.
There is Nothing Elaborate or Complicated about the —— System, and with the use of our Plans and Instructions, sent with every Outfit, any person with ordinary mechanical ability can install it.

Showing a facsimile of front page of folder. Such an installation as described in the picture could not be installed for less than $500 to $600, and would require an expert to install it, providing the well was already bored or dug.

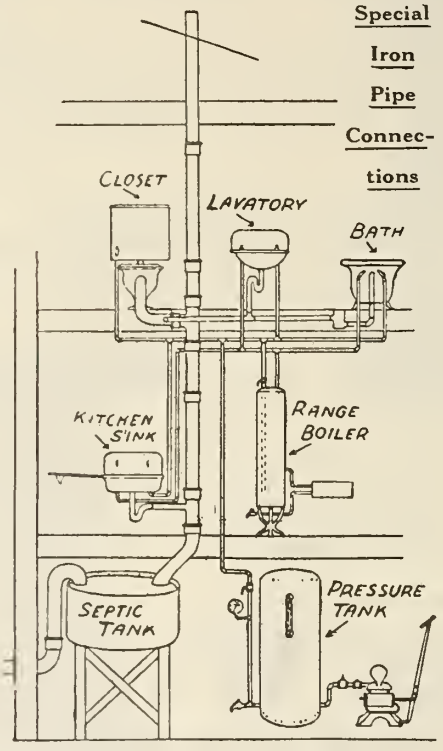
scribed as being all that is necessary to dispose of sewage. This latter is not only unfair, but is most dangerous and deceptive.

Just fancy, a septic tank all that is necessary. If a person residing in any of the following cities: Montreal, Toronto, Ottawa, Calgary, Winnipeg, Edmonton, Saskatoon, Victoria or Vancouver, B.C., St. John's or Halifax, N.S., were to even attempt to instal plumbing fixtures in the way described in these mail order folders, those persons would be arrested and subjected to either a severe fine or imprisonment. Yet here is a mail order house actually aiding and abetting what would be looked upon in any large city or town as a misdemeanor. That is only the legal part of the transaction.

The next is, that the installation is not such as would pass any board of health from a constructional point of view. Finally, and by no means least, is the sewage disposal plant, described as a septic tank, and shown installed in the basement of the house. This is "awful," to put it mildly. A septic tank is not by any means all that is required in connection with a sewage disposal system. And how any reputable firm can try to foist such an article upon the innocent public in the way it is endeavoring to do, is beyond our power to imagine.

The main object which the mail order house has in view when sending out circulars and folders which describe plumbing goods, pneumatic water systems, and septic tanks is, to get ready cash. They sell on the "cash with order basis," and if it stopped at the sale of the goods there would be little or no complaint to make. But when statements are made to the effect that only a little common sense and a wrench is required to instal plumbing, we certainly feel compelled to make a protest. In the first place the quality of goods is not even fair value if compared with the stock carried by the sanitary engineer. The cast iron enamelware has the appearance of being goods, which in actual fact may be anything that will hold water. If it were possible for every purchaser to compare the goods with any stocks ordinarily carried by a sanitary engineer, and at the same time be prepared to pay cash, there's not the slightest doubt but that the sanitary engineer would get the preference, and make the sale.

The plan shown of the piping in the proposed installation is not in accordance with that required by any up-to-date city. Next to be seen is the septic tank installed only within a few feet of the sink waste, and no provision for venting the sink. As our readers are well aware The Sanitary Engineer does not endorse complicated venting systems, but it draws the line when such a method of installation as this is being advocated. Here is a system of plumbing which would actually be a menace to the health of the residents. No residence thus equipped could be classed as sanitary, but rather the very reverse. The septic tank is another questionable feature, and is shown installed right in the basement. Any leakage which may develop would be



The above diagram shows a general layout of the Soil Pipe, Hot and Cold Supply Lines, illustrating how easily the work can be done by using our Special Iron Pipe Connections, doing away with all wiped solder joints.

in the house itself as it were, and we venture to assert that no provincial board of health would allow such a tank to be installed as shown unless of proper size and subject to a severe test as well as being fitted to a sufficient quantity of field tile piping, etc.

Again, even if the tank be all that could be desired, there is the nature of the soil to consider, the sewage disposal bed, and the quantity of piping necessary.

There is also the size of a tank to be considered. None of these questions are raised. All that is mentioned is, so much questionable merchandise is to be disposed of for cash: as to their being properly installed, or whether the goods are suitable is another question.

Although the assumption is that a house equipped with these bought (pig in the poke) goods would be sanitary, we know that such a home would not only be insanitary, but actually a great menace to the good health of both man and beast living in the near vicinity.

Further, every provincial board of health would require to know all about the installation, a proper permit must be granted, and proper workmen only engaged to instal the equipment. Therefore we very strongly assert that such methods of doing business should be looked into by the powers that be.

A few houses equipped as described in these folders, would be sufficient to pollute every well in the district, cause disease of almost any kind to be set up and spread throughout a community. We would ask our readers to peruse carefully various abstracts from these folders which we print herewith.

Under heading of

Sewage Disposal.

The problem of disposing of the domestic sewage from country homes where there is no sewerage system has been satisfactorily solved by the introduction of the septic tank. The outside closet and the leaking cesspool have been universally condemned.

The septic tank is the only method by which sewage in both liquid and solid form can be successfully disposed of in districts not reached by the city sewage systems.

The cost of the installation is but a trifle more than that of a cesspool. It is permanent and requires practically no attention.

Blank's septic tanks are made to connect in different methods inside the basement, also outside the basement below ground. It depends upon the conditions under which the system is to be installed.

Then follows the price of tank and a foot note which reads as follows:—

Each system presents its own individual problem, for correct solution of which we will be glad to give you all the necessary information.

No doubt they would be glad, if they actually knew themselves, but the fact is that no mail order house can give correct information "as per forms, etc." because as they state "Each system presents its own individual problem," and that problem is such a one as to require an expert to solve it by making a very careful study of existing conditions. The illustration we show of the whole "insanitary system" is accompanied by the following reading matter:

There is no mystery about the installing of a plumbing system, as can be seen by studying the accompanying illustration.

The feature which presents itself

(Continued on page 13.)

Analysis of Canadian Sanitary By-laws

This Series of Comments Relates to the Sanitary Engineering By-Law Number 449 of the Town of Oakville, Ontario—In Many Respects This By-Law is Far in Advance of Some By-Laws Now in Force in Larger Cities.

THIS series has been held over for some time, on account of having to receive more data in connection with them. The by-law under consideration is at present operating in the town of Oakville, Ontario.

GRADE AND EFFICIENCY OF DRAIN.

Clause (17).—The sewer pipe shall have when laid a uniform grade of not less than one-quarter inch to the foot, unless by special permission of the engineer, in which case provision must be made for regular and efficient flushing.

Clause (18) —The inside of every drain after it is laid must be left smooth and perfectly clean throughout its entire length.

Clauses 17 and 18 are simply of a general nature, but are necessary to remind those installing such work that it is essential to properly grade all drains as well as to clean all or any obstruction from each joint.

CHARACTER OF WORKMEN.

Clause (19).—The whole of the work shall be done by skilled mechanics, who shall be subject to removal by order of the engineer if considered not qualified or not efficient and the engineer is to be the sole judge of the work, and his decision on all points shall be final.

This clause is of by far greater importance than many people think. It bears upon the question of skilled workmen. But to make such a clause even more effective it would be far better to demand that all men should be compelled to pass some examination or other and obtain a certificate before engaging in such work. Another thing, as we stated before, there are very few town engineers who could be expected to judge this class of work, which sanitary engineers are called upon to install. We have very often heard of inferior work being allowed to be installed by such men, not because they are not good men and capable of seeing work done properly which would be expected of them as civil engineers.

CONNECTION OF CELLAR DRAIN.

Clause (20).—Cellars shall not be connected directly with a house sewer, but such connection, if required shall be made through a deep cast iron or metal trap, not more than four inches in diameter which trap shall be connected with the iron house sewer within the cellar, or it may be connected by an independent pipe with the common sewer.

This clause is all very good so far as it goes. No doubt it would be poor practice to connect it to the house sewer except it be trapped. We would not, however, think it advisable to connect a cellar drain direct to the main sewer unless there be provision made to ensure the trap being kept sealed. These cellar drain traps are oftener unsealed than sealed, because of the fact that cellar floors are so very seldom flushed out with water. The term "deep seal trap" is often used, but no definite specific seal is mentioned.

TRAPPING AND VENTILATION.

Clause (21).—No main trap or running trap shall be placed on any house drain bench to sewer but each soil pipe shall pass through the building from the house drain to a point above the roof, such soil pipe to be not less than four inches in diameter.

This clause is all to be desired. No doubt the main house trap has lived out its usefulness, if ever it was of any use at all, though to-day there are boards of health in various cities in Canada still adhering to the use of this obsolete method, simply because they fear the criticism of those who have been fighting against these traps. We have never heard of one real good reason yet which would justify the use of the main house trap. We understand that the City of Montreal have recently remodelled their plumbing by-law and still demand the main house trap and breather; we venture to say that the craft in Montreal cannot be too well pleased.

ROOF PIPES.

Clause (22) —Pipes for carrying roof water may be connected with or discharged through the house sewer, or may be given on outlet into a storm water sewer or other drain if convenient.

As this clause is general we need not comment upon it.

INSPECTION PIPES PUBLIC BUILDINGS, ETC.

Clause (25).—On branch drain connections from hotels, factories, railway stations, public buildings and other such premises as the engineer may require, a vertical 6-inch pipe shall be erected at or near the street line, this pipe to be provided with a proper cast iron cover supported by a cast iron frame, of a pattern to be approved of by the engineer. Such vertical pipes shall not be deemed to be necessary if the house sewer discharges into a manhole.

INSPECTION PIPES PRIVATE HOUSES.

Clause (24).—Vertical inspection pipes, or inspection chambers built of 9-inch brickwork in cement mortar with plugs or strong covers shall also be erected on all house sewers that exceed one hundred feet in length at such points as the engineer may specify.

SOIL PIPES.

Clause (25).—All soil pipes within the walls of any building shall be of cast iron, shall have placed at the foot thereof a "Y" branch and hand of cast iron with a stone or cement base immediately under the same, extend out through the wall and connect with the tile drain, and shall be continued full calibre to a point three feet above any opening. There shall be placed in position and caulked into the hub of the branch, placed at the foot of the soil pipe, a cast iron "Y" branch with brass ferrule and screw cap caulked into the hub for testing and cleaning purposes. Pipe shall have a cleanout at the base of each riser.

These clauses refer to one and the same subject. We do not think it necessary to build elaborate inspection outlets. All that is necessary is that there be capped outlets taken off each building branch, at intervals of not less than 50 feet when the drain is in a straight line. These should be taken off by inserting a regular Y fitting and bringing the outlet flush with the cellar or ground level. It would also be very beneficial in all sanitary engineering by-laws to demand that a cleanout be carried up to the ground level at every point where there happened to be a diversion from a straight line.

TRAPS TO BENDS.

Clause (26).—All plumbing fixtures of every house or other build-

ing shall be provided with sufficient traps and vents to prevent gas from the sewer, drain, or waste pipe, from escaping into any apartment, and each fixture shall have its own trap and sufficient vent; all traps to be accessible and as near the fixture as possible. The traps shall be of the same diameter and material as the pipe to which they are attached. No fixture shall drain through more than one trap and the vent shall not be less than one size smaller than the trap, and no vent shall be less than one and one-quarter inches in diameter. No trap vent pipe shall be less than four inches in diameter where it passes through the roof, and all vent pipes shall continue to rise after leaving the trap and pass out through the roof or connect with the soil pipe above the highest fixture on the line. The vent pipes shall be connected to the soil pipe below the lowest or last fixture on the line, with a bend and Y branch connection. Vents from water closet traps shall be two inches for three closets and for a greater number three inches in diameter. All soil or vent pipes where they pass through the roof shall be properly flushed with 5 pounds sheet lead and made water tight.

Trap vent pipes may be of standard wrought iron with cast or malleable fittings. Sheet metal will not be allowed.

This is a very important clause and one which is clear in many respects. We do, however, feel that such a clause would be better described if accompanied by a drawing showing a typical installation. While the clause is clear, we think there is room for a great improvement. It is required under this section to vent all w.c's irrespective of location. We do not think it is at all necessary to vent w.c.'s in batteries as described in this clause; nor do we advise that a single w.c. on a top floor be vented, where no others are connected above the said w.c. We also think that the last paragraph could be improved by mentioning that malleable fittings would be allowed. We never heard of "steel" fittings being asked for before and rather think that this is an error.

OPEN DISCHARGES.

Clause (27).—No safe waste, range-boiler, or cistern over-flow shall be allowed to connect with any drain but shall discharge openly into a sink or catch basin.

Clause 27 is one which is found in almost every by-law which has been remodelled recently and is a good one.

DISCHARGE OF DRAIN PIPES.

Clause (28).—All rain water leaders from eaves, if connected with the sewer shall discharge into a catch basin in the cellar, which shall be properly trapped. The trap for this purpose shall be deep sealed, placed near the catch basin and in such a position that same may be examined and cleansed from the catch basin.

Where roof water is conducted through the interior of building, not less than medium soil pipe shall be used and such pipe shall be connected with the hopper by a brass ferrule. Rain water leaders must not be used as back vents of any fixture.

This is another clause which would be very much improved if accompanied by a descriptive draining. There should also be some specific design of roof hopper. These roof hoppers can be almost anything but efficient if not properly designed for the particular location they are to be placed in.

WASTE PIPES.

Clause (29).—When a wrought iron waste pipe is used it shall be of standard galvanized iron pipe, and all joints in such pipe shall be screwed joints, and the burr formed in cutting shall be removed by reaming. Galvanized recess fittings. The waste pipe for one bath and one basin shall be one and one-half inches in diameter. If more than one bath and one basin are to be drained, the pipe shall be increased to two (2) inches in diameter and not more than six (6) fixtures shall be drained by said two (2) inch pipe.

No inverted joints of any kind shall be allowed below any fixture.

This clause is not complete by any means. For instance it should be mentioned that no 90-degree bends or elbows be allowed. That if the direction waste line is changed to 90 degrees, this should be done by using regular drainage Y fittings with plugged outlet. All drainage fittings should be recessed and smooth throughout, etc. Under this clause galvanized wrought iron pipe is demanded, but "All fittings to be of cast iron." is all that is said about fittings.

CAST IRON PIPES.

Clause (30).—All cast iron pipes shall be sound, smooth on the inside, cylindrical, free from cracks or sand holes, of uniform thickness, and shall weigh not less than the following per length of five feet, and shall have weight stamped on outside, and shall be placed so that weight stamp shall be visible.

Two inch diameter 20 pounds.
Three-inch diameter 33 pounds.
Four-inch diameter 45 pounds.
Five-inch diameter 66 pounds.
Six-inch diameter 75 pounds.

All cast iron pipes shall be coated inside and outside with pure asphaltum varnish except outside when laid in damp earth and should be done after test has been made, or immersed in linseed or other vegetable oil, to prevent rusting. All traps, bends or fittings shall be of the same thickness as pipe and shall be free from flaws and defects.

This clause is general as will be seen and only refers to the weight of pipe, etc. It would have been better to have specified that only cast iron pipe which is to be burned in the ground shall be coated with asphaltum, and all pipe used above ground be treated with a coating of vegetable oil. We do not think it is as good practice to allow all cast iron soil and waste pipes to be coated with asphaltum as this material will easily fill up defective casting, as well as pipe. In fact, even pipe and fittings to be placed underground should not be treated with asphaltum until the water test has been placed on such pipe lines.

LEAD WASTES, ETC.

Clause (31).—All branch, lead, waste and vent pipes and all lead bends shall be of the following weight per lineal yard.

1¼ in. in diameter, 6 lb. in yd.
1½ in. in diameter, 7 lb. in yd.
2 in. in diameter, 8½ lb in yd.
2¾ in. in diameter, 13½ lb. in yd.
3 in. in diameter, 13½ lb. in yd.
3 in. in diameter, 16½ lb. in yd.
4 in. in diameter, 18 lb. in yd.

All connections between lead and iron pipes (state weight, sizes and lengths) shall be made with heavy brass ferrules set in the hub of the iron pipe and caulked with picked oakum and lead, the lead pipe to be attached to ferrule with a good wiped solder joint. All connections between lead pipes shall be made with wiped solder joints.

As will be seen, this clause refers to lead washers and vents, and describes the sizes and weight of same.

The last paragraph of Clause 31 refers to brass ferrules, but no lengths or weight of same are mentioned. This matter should not be omitted by any means. The material should also be specified. We do not know of any fitting which can cause more trouble and annoyance than a poor ferrule.

EFFICIENCY OF SANITARY FITTINGS.

Clause (32).—No pan closets shall be fitted up or used in any buildings

and no closets or other convenience which allows the escape into house of air or gas from any part of it, or which allows any accumulation of filth in or about it, shall be fitted up or used.

Clause 32 is also of a very general nature, but it is well to have such a clause in all sanitary by-laws.

LOCATION OF SANITARY FITTINGS.

Clause (33) —No water closet shall be located in any sleeping apartment nor in any room or apartment which has not direct communication with the external air by a window or light-shaft with at least four square feet of area and a local ventilation pipe of galvanized iron at least four inches in diameter run into a flue or through the roof, and all soil pipe branches exceeding fifteen feet in length to receive water closets shall be carried up and through the roof and shall be at least four inches in diameter.

In this clause the question of location is taken up, but under this clause it would be quite within the by-law to instal a lavatory and bath in a compartment which has no connection with the outside air. We would not only advise that no W.C. be located in any sleeping-room, or any room not directly connected to the outside air, but would also include "any fixture which terminates in any house-drain or main sewer." The latter portion of this clause refers to the length which a branch receiving a W.C. shall be, etc., and reads: "and all soil pipe branches exceeding 15 feet in length to receive water closets shall be carried up and through the roof and shall be at least four inches in diameter." This is scarcely clear; for instance, suppose it be necessary to instal two W.C.'s in a basement and the position of those W.C.'s made it necessary to run a horizontal branch say 15 feet from the main horizontal waste line. This clause would require a separate vent stack to be run up through the roof, whereas it would be perfectly good practice to vent these two W.C.'s with a two-inch vent and then connect this vent into the main vent stack above the highest fixture.

STANDARD DRAWINGS.

Clause (34).—There shall be prepared a set of standard working drawings of plumbing, which said drawings shall be exhibited in a conspicuous place in the office of the engineer or inspector and copies thereon mailed to all licensed plumbers, carrying on business in the Town of Oakville, and all plumbing contemplated by this by-law shall be in accordance therewith unless by written permit of the engineer otherwise allowed.

We have repeatedly mentioned that plans should be prepared to illustrate certain clauses which are embodied in this by-law and we believe that clause 34, deals with this matter to some extent, in that it states that plans shall be prepared, etc., and placed in a conspicuous place in the office of the engineer or inspector. We do not think that this is enough; what should be done is that a copy of every diagram or drawing should actually accompany each copy of the by-law and be a distinct part of the by-law, so that it forms a part of the pamphlet page by page as each clause may refer to each matter to be described by the drawing. The balance of the clauses are of a general nature and such as are embodied in most by-laws. They deal with such matters as

Sanitary inspector.
Notice to construct or alter.
Notification for inspection.
Licenses.
Application for licenses.
Fees.
Duration of licenses.
Disposal of fees.
Penalties.

We reproduce them in full as follows:

SANITARY INSPECTOR.

Clause (35).—It shall be the duty of the Sanitary Inspector of the town to see that the provisions and requirements of this by-law are carried out and enforced and to make such inspection and tests as may be required.

NOTICE TO CONSTRUCT OR ALTER.

Clause (36).—Before proceeding to construct, re-construct or alter any portion of the drainage, plumbing or ventilation of any house or building, the owner or his agent shall notify the engineer or sanitary inspector, and no master plumber, plumber or workman engaged to construct, re-construct or alter any portion of such drainage, plumbing, or ventilation, shall do any work in connection with such construction, reconstruction or alteration, until such master plumber, plumber or workman has satisfied himself that the owner has filed such notice with the engineer or inspector.

NOTIFICATION FOR INSPECTION.

Clause (37).—The engineer or sanitary inspector shall be notified when any work is ready for inspection and all work must be left uncovered and convenient for examination until inspected and approved of. The inspection shall be made within two working days after receipt of notice. Notice given after 12 o'clock noon shall date from the day following. Where the soil is of such a nature that it cannot be left open for two days, the inspection shall be made forthwith. The engineer or the sanitary inspector may require either a water or smoke test or both whenever practicable in the opinion of the engineer or sanitary inspector, which test shall be made by the party whose work is being inspected. All tests shall be made in the presence of the engineer or sanitary inspector and the result of every inspection shall be recorded in the office of the engineer or sanitary inspector. For smoke testing any approved smoke machine may be used.

(Concluded in Next Issue.)

SANITATION AND THE MAIL ORDER BUSINESS.

(Continued from Page 10.)

most forcibly is the fact that there is not a single wiped joint connection or a soldered joint of any kind in this entire plumbing outfit. There is not a connection shown that any man with ordinary intelligence and a little handy with tools would have difficulty in making.

All the fixtures in this diagram are shown with iron pipe connections which can be connected to the cast iron and galvanized drainage fittings with an ordinary pipe wrench, and, with the aid of our very simple plans and instructions, it is absolutely impossible to go wrong.

We carry you through every difficult point by having everything explained in the most simple manner, and the use of our iron pipe connections make the installing of this system a work of pleasure.

With the advantage of such up-to-date methods there is no reason why everyone in the country should not enjoy the same sanitary conditions as those living in the city. Send us a plan drawn to quarter-inch scale or giving full dimensions showing the desired position of fixtures, and we shall be glad to give you an estimate on the material for a complete plumbing outfit.

Imagine a farmer furnishing dimensions, etc., scale drawings and the like, which would be clear enough to place the responsibility for such an unworkable scheme upon a mail order house. The whole thing is a pure piece of illusive deception, and we have no hesitation in saying that we do not believe any one of the officials of this mail order house would risk his own, or the lives of his family in a residence equipped with such a system as they advocate the public should adopt. In fact the health authorities would not allow them to do so.

The Sanitary Engineer feels very strongly upon this matter and earnestly hopes that every one of its readers will assist in fighting this dangerous scheme, which if allowed full sway, will pollute every locality in which its insanitary equipments are allowed to be installed.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Cc., A.M. Can. Soc. C.E

ARTICLE 2.

Bacteriology.

BACTERIA play such an important part in our daily lives that a knowledge of them is to the advantage of everyone and very essential to the sanitarian. Many facts are now known in regard to these minute living things and their habits, and the study of these proves interesting and even fascinating.

Bacteria were present on the earth long before man yet it was not till the year 1675 that a Dutch scientist is credited with actually seeing them. Their existence had been suspected before as the possible means of spreading disease but it was the invention of the compound microscope that enabled scientists to see and study them. It was two hundred years more, however, before the science of bacteriology was really established, and it is only within the last few decades that sufficient information has been discovered in regard to bacteria for us to understand their relation to disease, decay, putrefaction and fermentation.

Before the action of bacteria on organic matter was clearly understood it served to strengthen the old belief in the spontaneous generation of life. This belief, that plants and animals could come into existence without living progenitors, was held for centuries and has been upheld by many ancient philosophers and it is only recently that it has been satisfactorily disproved.

Bacteria are the lowest in the scale of living things and are unicellular or composed of one cell, whereas in the human body, which is the highest in the scale, there are millions and millions of cells. The cells in the human body are specialized and have different functions to perform, but the one cell of the bacterium has to perform all the duties of life.

The distinction between animal and plant life in the lower organisms is hard to determine and it is often a conventional one. Bacteria are classed as plants and like some other plants (mushrooms, etc.), are without chlorophyll, which is the green coloring matter we find in most plants. The following list shows the relation of the bacteria to other plants, ascending in the scale from the lowest to the highest:

Bacteria.	Mosses.
Yeasts.	Ferns.
Moulds.	Flowering plants.
Algae.	Non-flowering plants.
Lichens.	

In a previous article (see Fig. 1) the three general types of bacteria were shown, the coccus (plural cocci), the bacillus or bacterium (plural bacilli or bacteria), and the spirillum (plural spirilla). They are all called bacteria although the name strictly applied would refer only to the second type. To avoid confusion the second type might better be referred to as bacilli, leaving the term bacteria to apply to all.

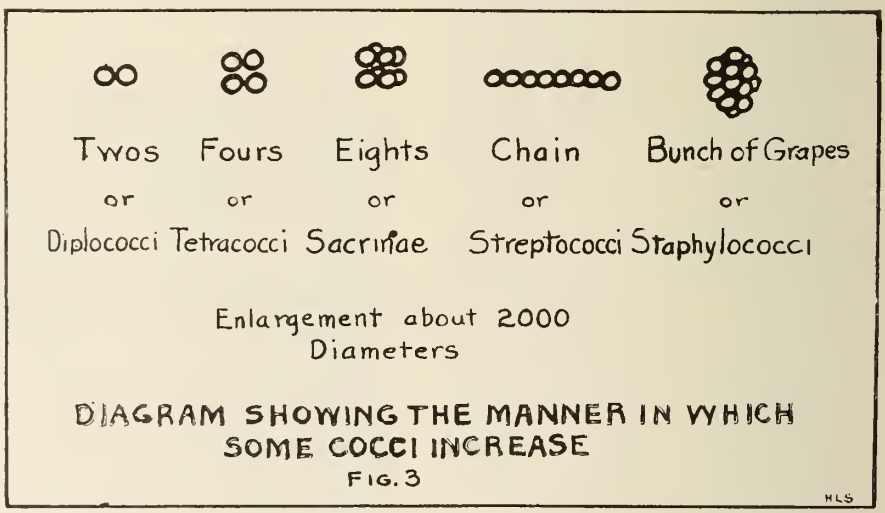


DIAGRAM SHOWING THE MANNER IN WHICH SOME COCCI INCREASE

FIG. 3

Shape.

The cocci are globular or spherical.

The bacilli are rod-shaped or cylindrical.

The spirilla are spiral shaped.

The three types have been aptly referred to as resembling billiard balls, lead pencils and corkscrews.

Size.

The cocci average 1-25,000 of an inch in diameter. The bacilli and spirilla are also generally about 1-25,000 of an inch in width but vary greatly in length, being generally 2 to 3 times as long but occasionally longer—even up to 1-1,000 of an inch.

While the bacilli and spirilla are generally longer than they are wide, they may so alter in size and shape as to be hard to distinguish from the cocci. The sizes given above are average and are the sizes of those generally found but no doubt very much smaller bacteria exist.

Rate and Manner of Increase.

Bacteria are said to multiply by simple fission. New cells are produced by the splitting of each bacterial cell into two parts. When these cells mature they again divide into two, and so on. The bacilli and spirilla generally increase in only one direction. This is accomplished by the cell elongating and separating into two shorter cells. The cocci, which are the same size in all directions, may increase in different directions, and give rise to interesting forms when the cells as they multiply remain together in groups. (See Fig. 3.) There are a great number of species of the streptococci and the staphylococci.

It should be noted that in microscopic work magnifications or enlargements refer to the number of times the object under inspection is apparently increased in any one direction and do not refer to the area. An ordinary microscope for bacteriological work is one that magnifies 1,000 diameters, written x1,000. An object under this microscope is magnified 1,000 times in width or 1,000 times in length. The area is increased, how-

ever, by 1,000 x 1,000, or one million times.

Most bacteria grow and multiply rapidly. A bacterium may reach maturity and divide in from twenty minutes to one-half hour. If division takes place once in an hour then one bacterium would be responsible in 24 hours for about 17,000,000 bacteria (2 multiplied by itself 23 times, written 2^{24}); if every half hour, for about 280,000,000,000,000 (2 multiplied by itself 47 times, written 2^{48}).

Under actual conditions multiplication never proceeds at such a rapid uniform rate as every half hour. Many of the cells die due to lack of food or, as will be later explained, from their own poisons and other unfavorable conditions.

Some bacteria are so small that it is suspected they can pass through the pores of unglazed filters, which would not allow the passage of bacteria of ordinary size. This is an important point to remember when we take up the study of filters. A single one of these small bacteria cannot be seen with the strongest microscope. Even the ordinary bacteria are so small that they are hard to detect or study alone. If, however, we make conditions favorable one bacterium can produce in 24 hours at least 17,000,000 cells and we get a mass of about 1-16 of an inch in diameter or greater. This mass, called a colony, can be easily seen and studied.

How Bacteria Move.

By the use of the microscope it can be seen that some bacteria move about while others do not, being incapable of doing so. The former are called motile, the latter non-motile. Attached to the motile bacteria are, generally, long or short hair-like organs called flagella (see Fig. 4). These organs apparently enable the cells to propel themselves through liquid substances.

The cocci are practically all unable to move and only a few species of cocci possess flagella. Some bacilli and spirilla that do not possess flagella have the power of motion. This motion is probably accomplished by the contraction and expansion of the cell matter. As a rule, however, it might be said that of the bacteria only bacilli and spirilla possessing flagella are motile.

Some bacteria possess only a single flagella at one end, while others have one at each end. The spirilla frequently possess a bundle of flagella at each end. The bacilli may have them attached at any place on the body.

The movements of motile bacteria are various, being of a darting, rolling or vibratory character. The speed at which they are capable of moving is dependent upon the temperature of the surrounding liquid, on the age of the cells and on other varying conditions.

Spores.

When bacteria encounter adverse conditions, especially lack of food, some of them have the power to produce cells which are called spores (see Fig. 5). The content of each bacterial cell, which is semi-liquid, undergoes a change and produces one spore, which is granular.

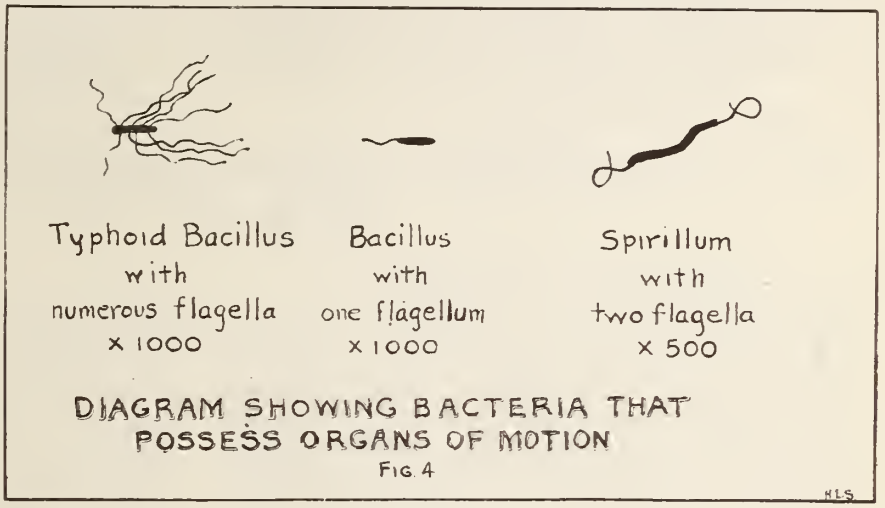


DIAGRAM SHOWING BACTERIA THAT POSSESS ORGANS OF MOTION

FIG. 4

This spore is surrounded by a tough, resisting cell wall. In the spore stage bacteria can withstand trying conditions which would kill the bacteria when in what is called the ordinary or vegetative stage. Since no growth occurs in the spore stage the term vegetative stage is aptly applied to the bacteria when they are actively performing their different functions of life.

Spore formation occurs chiefly among the bacilli and less frequently among the spirilla. The spores are always shorter but often broader than the original bacteria. They may be round or oval or short rod-shaped forms. Spores are never provided with flagella and have no power of motion.

As the spore forms the change in shape in the original cell in different species is interesting to observe. The spore may form in the middle or a short distance from one extremity of the cell and may swell out the original cell. When the spore forms at one extremity the resultant swelling produces a drumstick effect. Sometimes the spore remains in the old cell wall or it may pass out.

It must be well understood that spores are not a means of multiplication for each bacterium produces only one spore and the content of the original cell is used up. Spores are essentially a means of preservation. When the conditions are favorable the spore changes again into its original form and resumes its life work which may to us prove harmful, harmless or beneficial. Lack of moisture is fatal to the ordinary cell and if it becomes dried it dies. On the other hand, spores have germinated years after they have dried out. Immersion in boiling water will kill bacteria in the vegetative state, but spores can withstand boiling for a long time. Spores can withstand acids and other chemicals and also, as already implied, can exist without food.

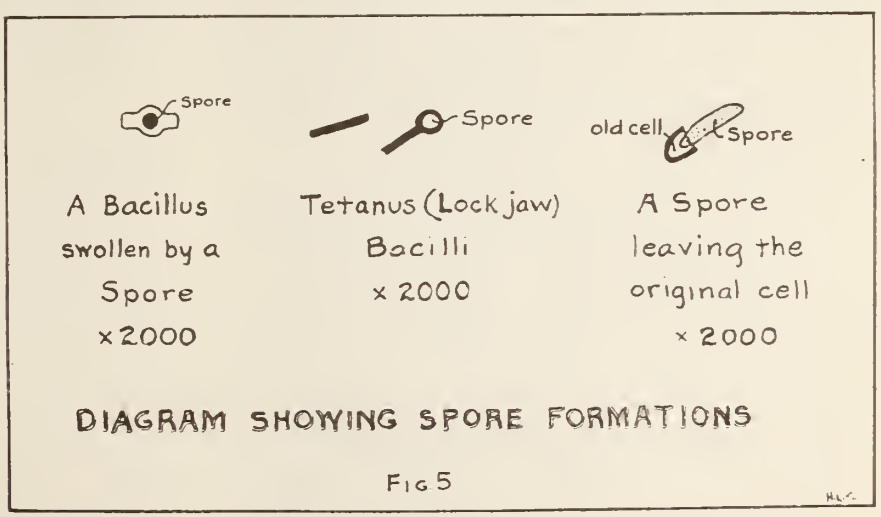


DIAGRAM SHOWING SPORE FORMATIONS

FIG 5

(Continued on page 26.)

The Sanitary Engineer

Plumber and Steamfitter of Canada

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TORONTO, APRIL 15, 1915

Mail Order Plumbing.

ANOTHER scheme is being given a trial, to cast reflection upon the art of plumbing, that of the mail order scheme. Here is a scheme that is being perpetrated by a concern which ought to know better. A concern which is advocating that a person should install his or her own plumbing. A concern whose officials would not dare to do themselves what they are advocating others should do.

What is to be the outcome? We know. It will be that a certain number of persons will hope to economise by purchasing an inferior line of goods and paying cash with order for them. Then these deluded purchasers will either try to bring into play a "little common intelligence" as the mail order house terms it, along with a wrench, etc.

If our various provincial boards of health allow such a scheme to go on, it is more than is allowed in our cities, even though the latter are almost swarming with curbstone plumbers. From what we can learn, a lot of these botchers are being driven from the towns and cities and are willing to install this cheap inferior mail order stuff, for a few cents an hour, simply because they cannot get a job in the cities on account of their inability to do a good job on the one hand, and on the other hand because town and city boards of health are becoming more strict in dealing with domestic plumbing installations.

There are two ways in which this scheme can and should be nipped in the bud in Canada, and that is, by sanitary and heating engineers advertising and showing good goods, making personal calls upon the farmers and rural residents, pointing out the evils of the mail order plumbing schemes; and next, the provincial boards of health should have the matter brought to their attention as soon as possible, before people get drawn into buying and installing such insanitary equipments, which may become a serious menace to those who reside in the near vicinity. We have referred to this scheme mentioned, in an article which appears on another page. We have reprinted parts of a folder which is being circulated throughout the country, and desire our readers to note the crudeness of the typical plan, and the sarcasm used in speaking of the wiped joint. The uninitiated would be led to believe that a wiped joint is a thing which is not necessary. Further if our readers will again note the plan they will see that even with all screwed joints this plan could not be followed. The waste from the lavatory and bath would not be considered a good connection by 99 per cent. of the tradesmen employed in the sanitary engineering business. No mention is made of roof flashing, how the soil pipe stack would be constructed, except that the readers of the folder are led to think this would be screwed together. Just imagine the amount of experience which is necessary to install such a system.

As far as we can glean, the whole scheme is just a case of unloading a lot of questionable goods, in a questionable manner, upon the innocent buyer. The septic tank is another feature open to a lot of suspicion and the price is altogether too high without proper specifications. No mention is made of the levels necessary, the nature of the soil the size or amount of irrigation and other kinds of tile pipe and fittings. These are all of no consideration until the person has bought several hundreds of dollars' worth of goods, and then, "plans, specifications and full information are forwarded."

The fact in a nutshell is, you are asked to be stung and then informed how the stinging operation was performed.

Convention Number.

THE next issue of *The Sanitary Engineer* will contain a full report of the coming Ontario society convention. It will be of particular interest to every member of the craft throughout the whole Dominion. There will be subjects taken up which will strike at the most vital points of the trade. Evils will be voiced and remedies suggested. We hope every member possible will be present, and thus assist in the work which must be gone through. This will be the last announcement of the event. Don't forget the dates, April 22, 23 and 24. Thursday, Friday and Saturday. Canadian Foresters' Hall, 22 College St., Toronto. The secretary has sent out a very earnest appeal to every member, which appears on another page, and every member of the craft should in all fairness, put forth every reasonable effort to be present, and assist in the work of uplifting the craft and improving conditions for one and all.

Real Patriotism.

WHAT is real patriotism? Is it joining the militia and wielding the bayonet or shooting down the enemy? Is it donating large sums to patriotic funds? We would reply no and yes to both these questions, and our reason for so replying is this: There may be lots of men who have joined the army and wish to fight at the front, who could be of far greater service to their country if they had not joined. Some there are who have joined, not in the spirit of real patriotism, but rather for the excitement there is in it. Some who have left dependents are not fit persons to join this great army, while there are thousands who have no dependents and have not a great many qualifications for serving their country in any better way. These are the men who should join the militia. Then there are those who have given and are giving large sums of money to the various patriotic funds. Such action, too may be the very reverse to real patriotism.

The real spirit of patriotism is a something which stands for service. The person who desires to be patriotic should first weigh himself and his qualifications up and say, "I serve. My acts and conduct shall all be inspired with the spirit of Service, and of finding out the best way in which that service can be given."

There are thousands of people who have subscribed to patriotic funds and cut down salaries, or curtailed their expenditure. These people are, many of them, letting their house go to rack and ruin for want of repair, they are cutting down advertising, they are buying cut-rate goods, all because the country is at war. Such persons are the worst class we have to contend with. They are the very worst type of traitors. The general repairs if done, would give work to scores of tradesmen, sanitary and heating engineers, painters, decorators, plasterers, carpenters, etc., and these men thus employed, would in turn buy from the grocer, the shoe store, dry goods stores, etc. The man giving $100 to the patriotic fund, and cutting down a needed repair or reconstruction to the extent of $100, is a traitor. He and his $100 have done the least amount of service they could have done. Real patriotism truly practised is, buying all our requirements from the proper source through proper channels, investing our money in such a way as to enable it to reach the greatest number of persons and giving your employer all the labor power you can so as to enable him to meet all the uncertain emergencies which crop up in times like these. The employer should pay the same salaries, and if necessary should be ready to sacrifice a portion of his already surplus cash. Such actions as this will create real patriotism. Those manufacturers who own large estates and have cut down salaries are on the downward path without exception. Their doom is sealed as sure as the rising of the sun each day. They are like the Kaiser. They have grown big by the united efforts of others, then when "these others" are confronted with war and all that it brings in its train, these manufacturers begin to contract, and shrivel up. The Kaiser has been held up as an example of greatness; but woe be to him who even tries to copy the example of the German Emperor. On the other hand there are employees who, because of cut salaries, etc., have curtailed their energies, they try to justify themselves in saying, "Well, the boss has cut my salary why should I not cut off work?"

Both these classes of men are on the downward path. Two wrongs never made one right, and both are wrong. The former ruins the earning powers of his whole organization and the latter ruins his capabilities for hard work. His mind becomes stale and stagnant, he soon develops into a rank pessimist. Neither of these classes can lay claim to being truly patriotic. They are traitors to both themselves and their country. Therefore let us each and every one take unto himself the motto "I serve" and see that the spirit of service shall be inoculated into every single word or deed.

Heating Engineers to Pass an Examination.

A BILL has been introduced in the New York State Legislature which, if enacted, will compel every employing steam and hot water fitter in the State to secure a certificate of competency. For this purpose the proposed law provides for an examining board of steam fitters and general power pipe fitters, whose duties will be similar to the present Examining Board of Plumbers. Each city will have its examining board, to be appointed by the mayor and to consist of two master fitters, two journeymen who have worked at the trade for ten years, and one mechanical engineer.

Commenting upon this matter, we feel that this is another step in the right direction, and one which should be considered in Canada. For some time *The Sanitary Engineer* has been advocating that all heating and ventilating plans should be certified by an engineering department of the boards of health.

Plumber and sanitary fixtures are under the jurisdiction of the board of health. Why not heating and ventilation?

In Toronto there is a motion before the city fathers to force every builder and owner to furnish sufficient boiler and radiating capacity to heat the buildings constructed and if we can get the co-operation of the boards of health to move in this matter, better days will soon be in store for both the public and the heating engineer.

As things are to-day, every man can install just as little or as much heating as he himself wishes to do, he can build houses for speculative purposes, install insufficient radiation, or too small boilers and get away with it, and the innocent buyer finds that he would have been money in pocket if no system had been installed. In connection with the competency or incompetency of the so-called steam fitter, he too may be anything. There are hundreds of men working as steamfitters and drawing big pay who do not in actual fact know how to thread a pipe properly. Therefore, to put the heating and ventilation of buildings under the jurisdiction of the health departments, as well as make every heating engineer qualify, both employer and journeyman, would certainly put the profession upon a much more creditable and higher plane, and at the same time be a boon to the country at large. This matter we may state should not only be applied to both steam and hot water heating engineers, but to warm air heating as well.

The Principle of Elbow Pattern Developing

A Complete Course, Treating in a Simple Way, the Art of Elbow Pattern Developing. Specially Written for Those Who Have Received Only a Limited Geometrical Education.

By EDWIN NEWSOME

IN this article is shown an elbow made up of five pieces, but in reality it is simply a regular three-piece elbow, the two extra pieces are gore pieces, or gussets. This style of elbow is often very convenient in ventilator work, and if carefully made, has a much neater appearance than the ordinary three-piece elbow. The writer has found it very convenient when a 5-piece elbow was required, particularly when a short throat was also necessary. Every tinsmith is aware how awkward it is to make a short-throated 5-piece elbow. To develop the patterns for this elbow, proceed as follows:

First draw an elevation, as shown in Fig. 1, which is done in the same way as when drawing the elevation of a three-piece elbow. From A draw parallel lines, as shown, to form the gore. A shows the perfect centre of the elbow.

Next connect these two lines as shown at B C. This will complete the gore. Line D forms one-half of the mitre, and must be extended as shown by the dotted line, which would take the place of a stretchout line for pattern of the gore piece. From point A draw a vertical line downward and with compasses draw a circle. This will be the plan of elbow.

Divide circle into equal parts, 1, 2, 3, 4, etc. Then erect dotted lines in the direction shown until they intersect the various mitres which are necessary for both the pattern of gore and elbow. Then extend these lines from A C to A B. From the points developed, draw the dotted lines as shown which run parallel with dotted stretchout line D.

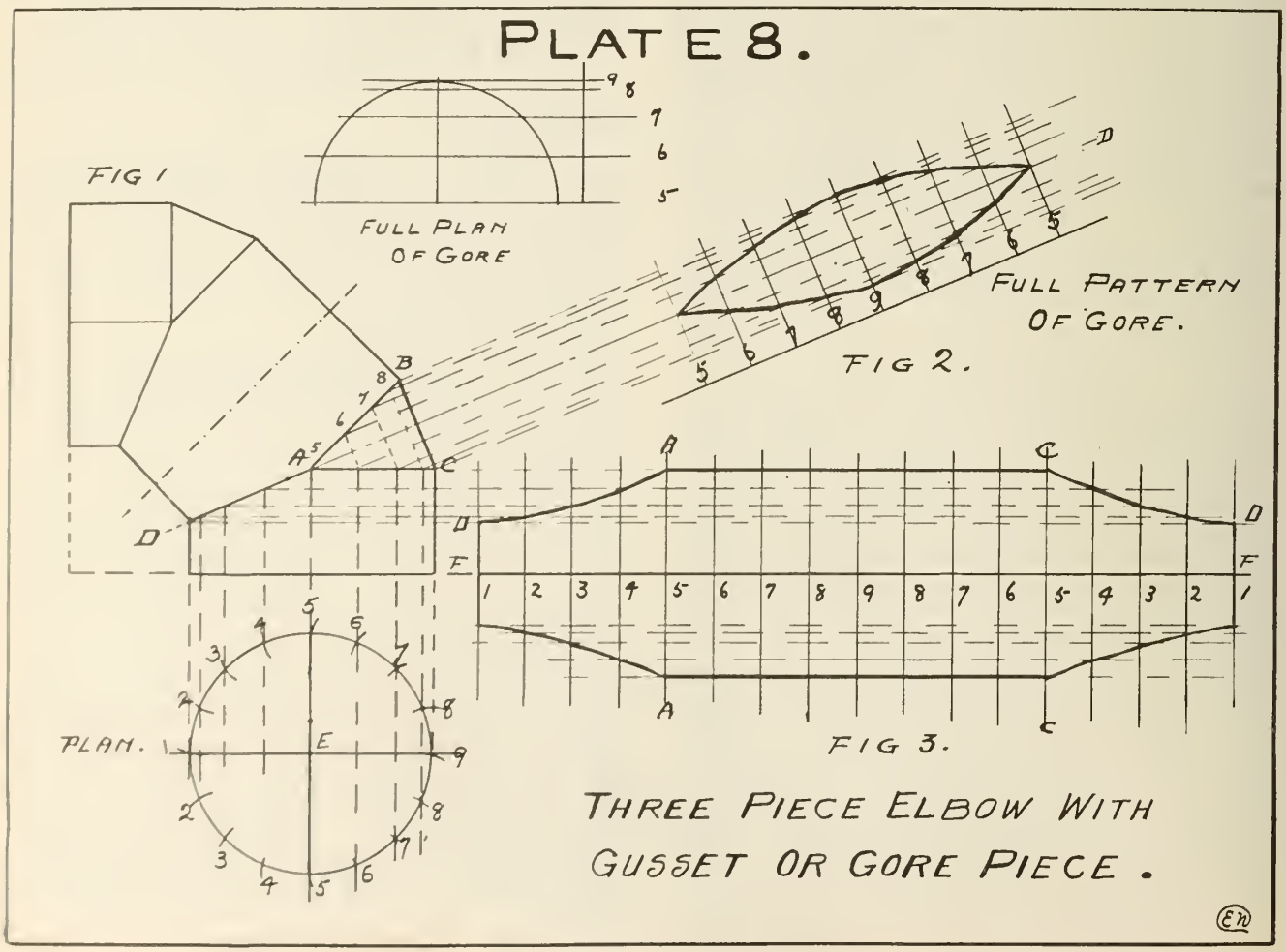
Next draw a solid line, Fig. 2, and transfer the points shown in plan of gore to the solid line, 5, 6, 7, 8, 9, 8, 7, 6, 5, this being the total length of the gore pattern. Erect solid lines from these latter figures which will then intersect all the dotted lines running parallel with centre dotted line D. At points of intersection is shown the pattern of gore.

Next draw line F. F. shown in Fig. 3. This is the stretchout for pattern of piece shown at D A C F F, Fig. 1.

Next transfer the measurements given in plan 1, 2, 3, 4, to the stretchout, Fig. 3. The next step is to draw a number of dotted lines parallel with the stretchout line F F and at points 1, 2, 3, 4, etc., erect solid lines. The points of intersection show the pattern of the elbow piece. In both the patterns, Fig. 2 and Fig. 3, the points of intersection should be connected when developing the drawing, or cut when developing the pattern.

If a 45-degree elbow is required it will only be necessary to cut one piece each of Figs. 2 and 3. Fig. 3 is then cut in two on line F F. The dotted line shown through the centre of middle piece shows an elevation of a 45-degree elbow. No allowance has been made for seams.

(To be continued in next issue.)



Practical Course for Sheet Metal Workers

ARTICLE No. 15 OF SERIES

By CHARLES SEIVERS

IN this issue we will take up the development of a round or cylindrical vessel. Before taking up the working out of its parts, it might be best to first take up a few points with regard to the method of figuring out the area and circumference of same.

To find the area of a circle multiply the square of the diameter by .7854.

Take for example a circle of 10 inches diameter. The square of 10 is 10, multiplied by 10 equals 100; .7854 multiplied by 100 equals 78.54, the area of a 10-inch circle.

To find the circumference of a circle multiply the diameter by 3.1416.

For example, take a circle 7 inches in diameter. Multiply 3.1416 by 7, which equals 21.9942 inches.

In common practice the decimal .1416 is not made use of, the fraction one-seventh taking its place, thus

Multiply 7 inches by 3 1-7, which equals 22 inches; this result compared to the one obtained by using the decimal shows a difference of less than one, one-hundredth of one inch.

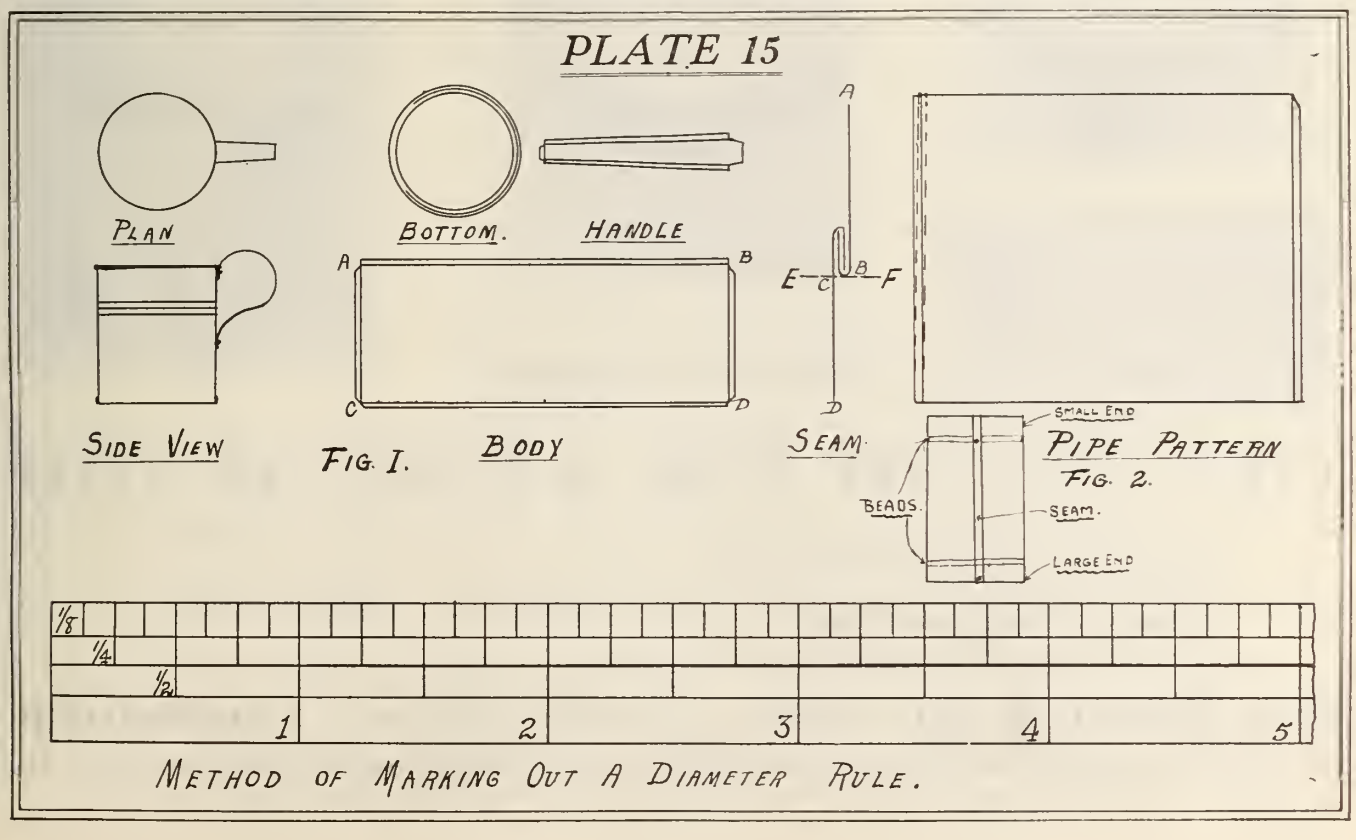
In dealing with the method of obtaining the circumference, we show an easily made rule. For this purpose it is convenient, and when made of sheet metal can be bent around most any curve, thus saving the necessity of using dividers or compasses. Its construction is simple. Take a two-inch strip of metal, half hard or springy brass preferred, and mark out as near as possible to 3 1-7 inches as many times as the length of rule is to be. Mark these spaces 1-2-3, etc., as shown, to show the circumference for 1-2 and 3, etc., inches diameter. Divide each space into halves, quarters and eights and mark off as shown.

In Fig. 1 we show the plan and side views of a round tin dipper. With height and diameter given or drawn, first mark out and form up the body of the dipper. To mark out mark off a strip in width equal to height of article, as A-B and C-D.

At one end, as at A-C, draw a line at right angles to A-B or C-D from A-C mark off, either by spacing with compasses, or by using a rule, the circumference of the article. If the spacing method is used, do not make the spaces too big, as by so doing a small amount of the girth is lost. If done by multiplying the diameter by 3 1-7, it works out pretty near exact, and if a diameter rule is used there is very little chance for a mistake being made. Having marked out the body, next allow the edge required for wiring at top and single edge for double seaming on bottom. The seam allowance is usually placed on each end, thus if a one-quarter inch edge is used, allow three-eighths of an inch on each end. The reason for this is shown at the drawing of a seam, the joint shown is cut at the lock by the line H-E-F, the line A-B above that line and C-D below. Make up the complete line A to D, leaving the three edges over, which have to be allowed as described above. After forming up body, and turning edge to receive bottom, the size of blank to make same is measured for with rule and compasses.

The inner line on bottom shows size of article, the middle or incomplete line the size of edge turned out on bottom of body, and the outer line the size of blank required to seam on to body. The handle is a tapered strip with a wired allowance on both sides, the projection

(Continued on Page 26.)



Getting After New Business

Sanitary and Heating Engineers in Large Towns and Cities are "Seeking" and "Finding" Business—Becoming Better Salesmen Every Day—Quite a Large Number are Realizing an Improvement in Their Business.

Sixth Article of this Series.

ONE of the most encouraging bits of news to come to our notice is, that sanitary and heating engineers are really getting new business. They are taking advantage of the offer of cuts and half tones, which the manufacturers of sanitary fixtures are furnishing free. One manufacturer stated that several of his customers had been furnished with cuts and that they could trace business as a direct result.

Another instance came to our notice where a sanitary and heating engineer doing business in a small country town, complained that he was not getting all the business in his locality because the sanitary engineers from the larger towns and cities near by were coming out to the country and getting business, and even though "registering his kick," as he termed it, to The Sanitary Engineer, for advising the city craftsmen to "get after the farmer," he was frank enough to state that he would be "tickled to death" for such advice had he been a city plumber. This man is busy and was actually making a few calls upon a few good journeymen who had had some experience in installing domestic pneumatic water systems and septic tanks.

Speaking to a real estate agent recently, Sanitary Engineer was told that his company were doing more repair work and remodelling of bathrooms, etc., this year than they had done for years. All that is required of the sanitary and heating engineer is, that he be up and doing, plan ahead, further ahead than has usually been the case. Quite a number of the craft have branched out into the hardware business, and find that business is improving all along the line; that when customers come in for hardware, they see a nice display of sanitary and heating goods, or having a gas water heater connected up for the purpose of giving practical demonstration has resulted in several sales. We will be pleased to hear of any new ideas which have brought business, so as to be able to "pass it on" to the other fellow. This cornering every new stunt, very soon works to the detriment of the one who corners it. Do unto others as you would like to be done by. Pass it on and we'll all be happy.

Made-in-Canada

FIXTURES FIT FOR A KING OR YOU

No home is complete without the above set of fixtures. We can install any or every fixture shown above in any home, farm, city or rural.

We carry a full line of pneumatic water systems for country homes, **"which will furnish comfort on tap 24 hours a day."**

Call and see our stock of Sanitary Fixtures or drop us a post card and we will call on you.

Ray, Brown & Co., Sanitary and Heating Engineers, **Comfortville**

Cuts by the courtesy of Standard Ideal Company, Limited, Port Hope, Ontario

Ideas to Create Business

Employment for Every Man Engaged in the Business—Endeavors Should be Made to Create New Business—City and Town Councils Should be Canvassed—Comfort Stations Should be Built in Such Times as These.

AT times like the present when a number of shops are working short time and many journeymen are out of employment. the trade should unite. They should form a delegation and meet their city or town council and show them the need for comfort stations. No country is in greater need for these comfort stations than is Canada. Every municipality is endeavoring to find some legitimate employment for the unemployed and comfort stations are a great necessity to the health and well-being of our race. The building of such places would find work for thousands of journeymen at the present time all over Canada.

It may be argued by some that sanitary engineers have enjoyed a long period of prosperity. From such a statement we most emphatically differ. It may be alleged that the journeymen engaged in this profession demand too high a salary and that there are men who cannot earn as large a salary who should be given employment first. To such an argument we might reply, that if our journeymen earn a higher salary, they spend that salary, and when they spend it, they in return give a greater volume of employment to others.

If a man earns $25 a week and is fortunate enough to be able to put $5 of that sum away for a rainy day, he is a much greater asset to the community in which he lives than the man who can only earn $15 a week and save the same proportion, or the man who even spends the whole $15. The trouble with this old world is, we have too many savers. There is too much money in our banks, and once the bank gets it on deposit, it ceases to assist the laboring classes very much—at least by no means as much as if it were kept in circulation by the wage earner for the wage earner.

The moment war was declared those who had money held on to it, and under the present dispensation we do not blame them; but the result is that business has, to a great extent, become stagnant. The day is not far distant when the man who is known to be hoarding his surplus money and depositing it somewhere for safety, will be looked upon as little better than a traitor.

For instance, we hear a great deal about patriotism and production these days. We also hear of large sums being donated for the patriotic funds, etc. Now, what does all this amount to? It simply means that some people are giving sums of money to aid some scheme on the one hand, and on the other they are cutting down expenses.

If instead of doling out dollars in such a charitable spirit, everyone were to look around and see what work could be created, then every man would be employed and be better able to produce more.

"Charity! The greatest of these is charity." The greatest what? Why? The greatest curse, of course. No honest man desires to receive charity; he wants work. He wants to earn all he can and pay his proportionate due. This war is going to do much for the sanitary and heating engineer. It is going to make a business man out of him. It is going to make him more self respecting. It will make him go after business and show his patrons that he can be of great service to them, that charges from now on are going to be fair. One of the reasons why the bill of the plumber has been looked upon as altogether out of all proportion to services rendered has been that the employer has not exercised proper judgment in explaining the why and wherefore. Then again the sanitary engineer has not had to cater for business; his work has come to him. Another great source of annoyance has been caused by not going more thoroughly into details when tendering on work, or when installing sanitary work.

Not very long ago the writer had a case brought before his notice where a certain quality of brass goods was specified. When the installation was checked over, it was found that a very much inferior kind had been installed. Of course the sanitary engineer did not intend such a thing to have happened, and he at once changed them; but the occurrence created a bad impression. It is such incidents as this which cause the public to cut down all possible work in the sanitary and heating line.

If the trade had made any great amount of wealth by such a line of conduct, it would not be so bad; but they have not, and there's the rub.

What is most necessary to-day is that the profession gain possession of the public's confidence. This can be done in many ways. In large centres the association should get out a good readable story printed in folder form, and see that these folders get into the hands of the thinking business man. Such folders should state just what the sanitary engineer can do for the public. For instance, take the water meter question. Show what the great waste of water means to every individual city dweller. Show that the united city water works which are in operation in Canada to-day would be amply large enough to supply water to twice the present population; that sewage disposal plants are being ruined by having too much water poured into them; that the main house trap and breather costs on an average about $10 per house, and that the towns and cities who demand them prevent the proper ventilation of sewers. Bring a few of the profession's grievances home to each business man's notice and in that way get a hearing. Don't allow every cub editor of the daily newspaper to "put it all over the trade" and never a word in reply. If the trade desires a fair and honest hearing, they must employ new methods. Take up the comfort station problem in a folder, secure the endorsation of the medical faculty, show the public how many men would be given employment apart from the sanitary and heating engineers. The tailor would make more suits, the grocer would get his bill paid, rents would be paid, and not be allowed to pile up. Get right down to hard facts, and be united in the effort. No man liveth unto himself alone and never will. A little reasoning with the public and less resentment will go a great way towards creating new business which is so much needed by all at this time.

INTERESTING LECTURE.

Every member of the trade, whether a member of the society or not, is invited to attend a special open meeting of the Toronto Branch of the Ontario Society of Domestic and Sanitary Engineers, to be held in the Canadian Foresters' Hall, 22 College street, on Thursday, April 22nd, at 8 o'clock p.m.

Mr. E. S. Stack, of Boston, Mass., is to give an illustrated talk on "Heating Water With Gas."

Mr. Stack has spent a life-time in the gas water heater business and is the patentee of the "Stack" gas water heater, which is now being made in Canada by a well-known manufacturer in Toronto.

NEW ESTABLISHMENT.

D. Thompson & Co., have opened up a new store on Main street, Port Dover, Ontario. They will stock a full line of plumbing and heating supplies and will carry on the business of sanitary and heating engineers.

APPOINT NEW REPRESENTATIVE.

The Bowes, Jamieson, Ltd., Hamilton, have appointed Allan Tilley as their eastern representative. Mr. Tilley was formerly of the Hanson-Tilley Co., Montreal. He will cover territory from Kingston eastward to Quebec and provinces.

SANITARY ENGINEERS MEET.

In preparation for the examinations of the Royal Sanitary Institute of London, England, which will be held in May, members of the Regina branch of the Sanitary Engineering Association of Western Canada are making arrangements to conduct a test examination next month. A meeting to arrange the details of this test examination was held recently in the offices of Dr. Bow in the City Hall, Regina.

NEW PARTNERSHIPS.

Messrs. Rufus & Lloyd Tetlock, Carleton Place, Ontario, have recently formed a partnership and will carry on a sanitary and heating engineering business. Their establishment will be situated on Bridge street.

• • •

W. S. Rattray and A. C. Dunaway, of Kamsack, Sask., have formed a partnership in the automobile and plumbing business. As a temporary garage they have secured the former implement warehouse opposite the Star Theatre.

HAMILTON'S NEW PLUMBING BY-LAW.

The new plumbing by-law, prepared by David Wark, the city's inspector, has been given its third reading by the council, and will become law within a few days. These regulations call for all pipes to be tested before they are finally concealed. The test must be a water one where possible, otherwise a smoke one. A new system has been devised for collecting fees.

Before it cost a dollar for a plumbing permit for a house up to $5,000, two dollars between that and $10,000, and three dollars over $10,000. Now a fee is levied according to the number of fixtures. For from one to five fixtures a charge of a dollar is made, and each additional fixture will cost the owner of the building twenty-five cents extra. The council adopted Inspector Wark's recommendations unanimously, declaring that they were along a much-needed line.

COMPLIMENTS FOR SPRING NUMBER.

Sanitary Engineer,
Toronto, Ont.

Mr. Newsome,—I take pleasure in sending you my congratulations on the spring issue of your paper, The Sanitary Engineer. It is not necessary for me to say that this number has reached a higher standard than any of previous date.

After waiting patiently and with keen interest to have a look at the result of your latest and best efforts, I am pleased and only hope you and your company's future success will be in keeping with this spring number and my hearty good wishes.

Say, that Vitro advt. is a boomer.

Yours respectively,
(Signed) JAS. R. TATE.
Milton, Ont.

Professor Bateman Compliments Sanitary Engineer.

Professor Bateman, director of the Anglo-American Sanitary Correspondence College, refers to our spring number and in part says:—

"Accept my hearty congratulations on your publication, you're doing just fine and the spring number is certainly something to be proud of. Again, your optimism is just wonderful and is most encouraging to your readers. I wish you all the success in the world in your good work.

Yours fraternally,
ARTHUR BATEMAN."

WAR TAX NEWS.

Post Office Department.

Ottawa, Canada.

The Post Office Department, having given notice a week or two ago, in connection with the War Revenue Act, that all letters and postcards mailed in Canada for delivery in Canada, the United States or Mexico, and letters mailed in Canada for delivery in the United Kingdom and British possessions generally, or wherever the two cent rate applied, should in addition to ordinary postage carry a one cent stamp as a war tax, and also having notified the public that such war tax, while it should be paid preferably by the postage stamp marked "War Tax," could if such stamp were not available be paid by an ordinary one cent postage stamp, is now issuing further notice to the effect that postage stamps may be used for the prepayment of war duties on bank cheques, bills of exchange, promissory notes, express money orders, proprietary or patent medicines, perfumery, wines or champagne, as well as upon letters and postcards, postal notes and post office money orders, the intention being to provide facilities in those portions of the country where excise stamps are not readily available. This in view of the fact that postage stamps may be obtained at all points over the whole country, in many places where there is no Collector of Inland Revenue and no Inland Revenue stamps could be obtained, is a distinct convenience to the public, and no doubt will be largely taken advantage of.

A WARNING.

The trade are respectfully warned that some person or persons are soliciting orders for technical books and are collecting money on account. These persons are stating that they represent Professor Arthur Bateman, director of the Anglo-American Sanitary Correspondence School, and that the books are written by Professor Bateman. Such, however, is not the case. Will any of our readers who may be visited by such a person please get into communication with the above named institution, 10 and 12 Ontario street west, Chicago, Ill.

NEW PARTNERSHIP.

Dennis J. Shea, sanitary engineer, Carleton Street, Fredericton, N.B., announces that the business previously carried on by him will be known from now on by the name of Shea & Son., he having taken into his business Frederick D. Shea as foreman. Mr. Shea has been in the plumbing and metal business for twenty-five years and has seen a great many changes in businesses and business methods throughout this district.

The opening of the Shea business started way back in 1890 in the City Hall Square under the name of Kitchen & Shea. Business developed so rapidly under the energetic management of the two men that the shop had to be enlarged from time to time and finally was moved to Queen street, opposite the present post office. Business continued to grow and this shop was enlarged.

In 1900 the partnership of Kitchen & Shea was dissolved and Mr. Shea assumed the responsibilities on his own account. A new move was made to the Coy Block, Queen street. Business continued to grow and Mr. Shea was obliged to move to the Sharkey Block, where he remained for five years until he purchased his present building on Carleton street.

Back in 1890 there was very little hot water heating in this part of the country and what was done here was installed by outside firms. As this method of heating grew in popularity Mr. Shea made a bid for installations and was successful in closing a great many orders in competition with the firms which formerly held the trade.

Shea plumbing and heating is giving satisfaction to the bulk of the residences here and many of the public buildings have Shea installations, among which are military buildings, Science Building, Queen Hotel, Chestnut Canoe Factory, Edgecombe's dry goods store and the new Smyth street school.

During the past three years Mr. Shea has branched out into the country districts and has closed many orders for complete outfits for plumbing, heating and water supply. Farmers are demanding all the conveniences of the city and Mr. Shea is able to fill the bill with his installations.

Besides the heating and plumbing business Mr. Shea makes a specialty of metal roofings, cornices, skylights and all classes of sheet metal building materials.

When asked as to what he attributed the success of his business Mr. Shea said: "I give the customers good honest service—which means the best materials and honest workmanship. I always feel that the first order I get from a customer is just a starter of other business to come and I work my head off to give that customer the best job possible. I do get repeat orders and I treat each one just the same. I have built up my business by good hard work and I have succeeded. Now, I need my son in the business with me to give it new blood. The youngsters are coming into the field now and we've got to give them their chance to make good.

Mr. D. J. Shea is not only a splendid and tactful business man, but he is also a live member of the Canadian Society of Domestic Sanitary and Heating Engineers. This body appointed him to the position of vice-president for the Maritime Provinces last June.

FOURTH ANNUAL CONVENTION OF THE ONTARIO SOCIETY OF DOMESTIC SANITARY AND HEATING ENGINEERS.

A Letter From the Secretary.

Because you are a member of the Ontario Society of Domestic Sanitary and Heating Engineers, you are expected to attend the fourth annual meeting of the society, which will be held in Toronto at No. 22 College street, on April 22nd, 23rd and 24th, 1915. You have a perfect right to be present, to voice your opinions in the many matters that will be taken up, that concern your individual affairs. So see that you are there.

If you had not intended to attend, what are your reasons? Are the directors to believe that you are satisfied with their operation of the affairs of the society (and do not forget that they are your own affairs); also that you are satisfied with the present conditions that you are conducting your plumbing and heating business under? Such being the case, you have sufficient of this "world's goods," both financially and otherwise, that you are independent of your plumbing and heating business, and only conduct same as a hobby or means to imitate Carnegie and his libraries.

Or are you so dissatisfied with yourself and your affairs, that you blame everyone else for your condition, and do not intend to make any move that will improve your or the other fellow's condition in this world of trial and tribulations?

Consider for a moment our craft and your experience in same.

Did you receive adequate return for the time, money and energy that you expended during the past five years of prosperous times, from your plumbing and heating business? Have you the satisfaction in knowing that your conditions are such that you can laugh at those who accuse you of being engaged in a business that is composed of robbers and the like? Have you got that which you are accused of having, and can sit back and ignore your competitor, who does not seem to have been so successful in getting his share?

I doubt if you can, for with conditions such as our craft have and are working under, neither you nor any other person could plead guilty.

Therefore, if our conditions are ever to be improved, it requires the wholehearted efforts and energy of yourself and everyone else engaged in our craft to make a united stand to gain these improvements. Now is the time to be up and doing, so that we may be in a position to get our just share of the coming prosperity of our country, that will be bound to follow these troublesome times.

It is up to you individually to do your part, and not expect the other chap to do it all. So make up your mind to attend the fourth annual meeting of your own society, with the firm intention of doing your best to assist in securing ideal conditions for the sanitary and heating engineers of Ontario.

I refer you to the April bulletin of the society for some of the questions that concern you, and which will be taken up at the annual meeting.

Awaiting your reply, announcing your intention of being present at the above time and place. I beg to remain,

Yours to command.

G. F. FRANKLAND.

1093 Bathurst St., Toronto. Secretary.

A COMMUNICATION.

President of Canadian Wolverine Co., Ltd., Sends Out Letter to Trade.

Chatham, Ont., April 12, 1915.

To Our Esteemed Customers:—

A very disastrous fire swept part of our plant in the early morning of the 10th inst.

Our stock on hand including many orders ready for shipment is total loss. The patterns for our staple brass goods, such as compression work, fuller work, and traps were destroyed.

It will require a considerable time to replace these patterns and tools and rebuild our stock of such staple goods.

Special Notice!

We will be in position to accept your orders and give you service on our large line of plumbers' specialties and rubber goods within ten days from date.

If you have unfilled orders with us, a separate letter will be sent you to-morrow and you will be notified if there are any items we cannot ship you with reasonable promptness.

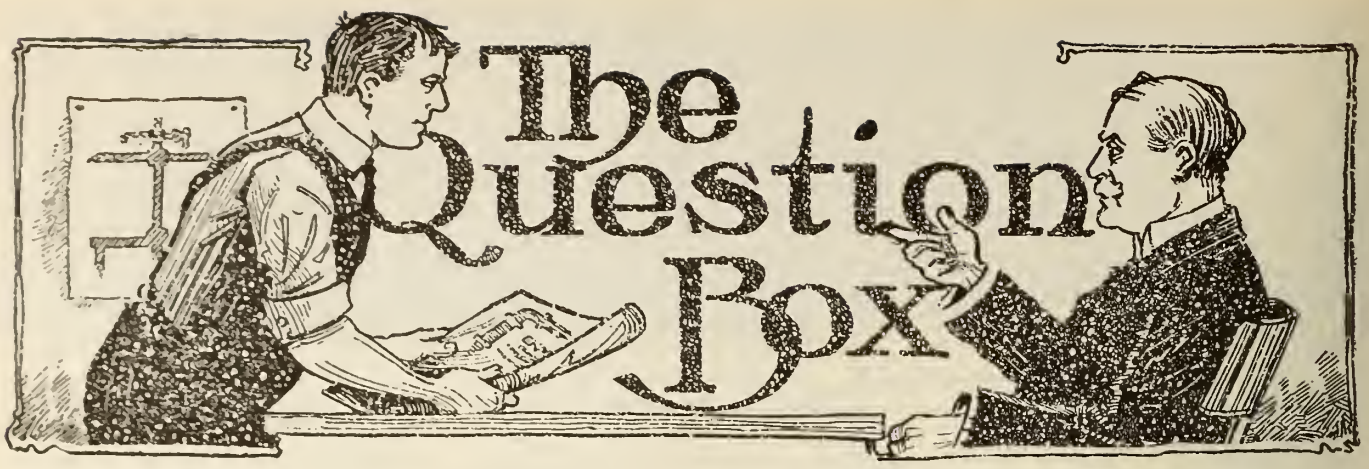
Under no circumstances will any stock be forwarded which received the slightest damage from water or smoke.

We shall exert every possible human effort to deserve a continuance of your valued patronage.

Very respectfully,

CANADIAN WOLVERINE CO., LTD.,

L. A. Cornelius, President.



Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

How Is This Pattern Developed?

Editor Sanitary Engineer.—Will you please show through the medium of your paper how I might with accuracy develop the pattern for horse trough with semi-circular ends. See sketch below. I find difficulty in getting any required size with accuracy.

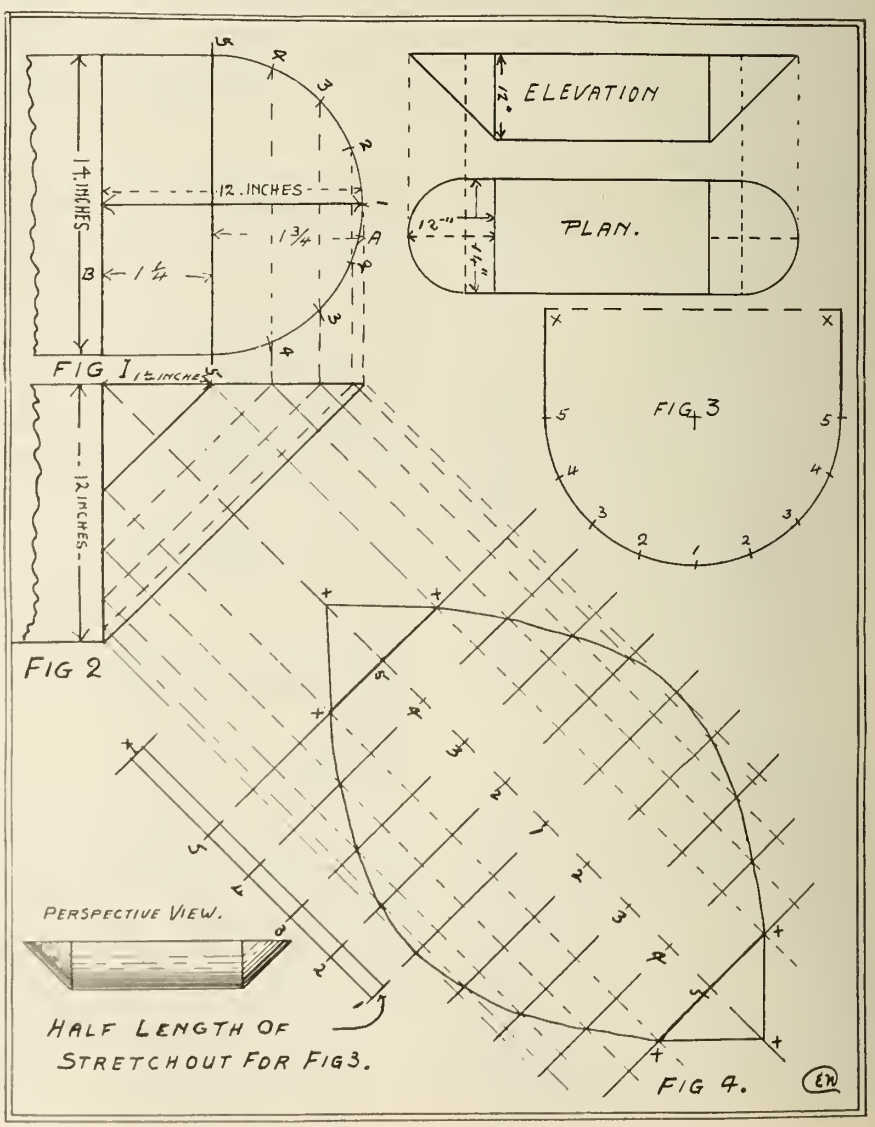
I. F. B., Sask.

The accompanying plan shows how any pattern may be developed for this type of trough end.

First step of course is to draw the elevation as shown Fig. 2. The next step is to determine the exact shape and size of the end. The original drawing was made quarter size. It will be seen that our inquirer wants to develop an end for a trough 14 inches wide and 12 inches deep. The elevation, Fig. 2, does not give any idea of what the width of the trough is. Neither does it give the radius of the circle.

However, the width is to be shown as quarter size, thus a half circle will be 3½ diameter, and 1¾ from centre to A, and 1¼ from centre to B. These two measurements make up a total of three inches, which is one-quarter the depth as well as length of end.

Having drawn the half circle Fig. 1, it must now be divided off into eight equal parts as shown at 5, 4, 3, 2, 1, 2, 3, 4, 5. It will be seen that these figures take up the entire half circle, being the quarter size of width which is necessary, viz.: 14 inches (full size). Now extend from centre line to line as shown at B, 1¼ inches. This makes up the plan of end. Next step to take will be to carry dotted lines down from points 1, 2, 3, etc., to the centre line in Fig. 2 until 1, 2, 3, 4, 5, etc., is completed. Now carry lines at 45 degrees to vertical line on Fig. 2, and draw dotted lines at 45 degrees from both the horizontal as well as the vertical line of Fig. 2, from points developed from the half circle. Use the centre dotted line for a stretchout line and transfer the measurements 1, 2, 3, 4, 5 and repeat to this centre line. Now cross these dotted lines at points 1, 2, 3, etc., beginning at 1 in the centre until 5 is reached. Then place the compass point at x x, and open up 1¼ inches. Now join x, x, on stretchout line at 5 to whatever point this last measurement is. Having completed both the dotted and solid lines 1, 2, 3, 4, 5, etc., Fig. 4, proceed to finish the pattern by connecting each in-



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HOW IS THIS PATTERN DEVELOPED?

(Continued from page 24.)

tersection as shown by the two curves, and the pattern is completed with the exception of allowance for seams and edges.

The chief point in this problem is the difference between the width and depth, but suppose this trough had been the same width as depth then the only difference there would be in the two patterns would be that the solid line at 5, xx, would have come to a point. It will be noted when this pattern is developed the trough is straight from point 5 as shown in Fig. 3. The small plan and elevation shown on top right corner are the sketches submitted.—Editor.

Noted Inventor Dead.

John D. Walsh, superintendent of the American District Steam Company, Buffalo, N.Y., and holder of numerous mechanical patents on the first underground heating system of the world, died April 13, at his home, No. 251 East Avenue, Lockport, N.Y. Mr. Walsh had been ill for months and in January was compelled to return to Lockport from his winter home in St. Augustine, Florida. The late Mr. Walsh was born in Lockport, N.Y., 74 years ago, and was educated in Lockport Union School; learned patternmaking trade with the late Birdsall Holly, famous inventor and founder of the American District Steam Company, now located in North Tonawanda, N.Y. When the steam company's plant was opened in 1877 Mr. Walsh immediately became superintendent. Deceased for four years had served in the Civil War. He was member of Sprout Post, G. A. R., Exempt Firemen's Association, Branch 31, C. M. B. A., and also was charter member of Lockport Council, Knights of Columbus. Surviving are one son, William H. Walsh, and two daughters, Miss Bessie B. Walsh of Lockport, N.Y., and Mrs. L. A. Usina, Jacksonville, Florida, and one sister, Mrs. George Lethrum.

PROBLEMS FOR SHEET METAL WORKERS.

(Continued from page 19.)

on either end being used to rivet on to body. The length of handle can be got by spacing, or if not marked out, by forming up narrow strip to suit, and then using as pattern for length.

At Fig. 2 is shown a pipe pattern. This needs but a small amount of time, yet quite often pipes do not fit properly. The length of the pipe is usually governed by the width of the sheet. Mark off the circumference to suit diameter required. Then mark off the seam allowances to suit folders, and at one corner mark back on the sheet the amount to be taken off to allow pipe to enter into another, as shown by dotted lines, which then forms seam allowance. In order to readily tell small end it is customary to cut a notch off that corner, and in finally completing the pipe a rivet should be placed at both ends. The small end of the pipe should have the rivet about 2 inches from extreme edge, and the large end the rivet is placed at the edge. See sketch of pipe, Fig. 2.

(Continued in next issue.)

PRACTICAL SANITARY SCIENCE.

(Continued from page 15.)

It will be seen that an important classification of bacteria can be made in respect to whether or not spores are formed. The two classes are termed spore-forming and non-spore-forming. As far as we know, most of the well-known disease-producing or pathogenic organisms do not produce spores. If they did disease would be much more prevalent and fatal than it is now. Tetanus or lockjaw is one of the few diseases that is caused by bacteria that are able to produce spores. Typhoid, tuberculosis, diphtheria and cholera bacteria are some that fortunately do not produce spores.

All bacterial cells, whether in the vegetative or spore stage, can be killed by heating them to a sufficiently high temperature. As before mentioned, the spores can withstand a much higher temperature than the ordinary bacteria. Raising the temperature sufficiently high to kill all the cells is called sterilizing the substance or object in or on which are the bacteria. No further decay, putrefaction or fermentation need be feared if fresh bacteria can be kept away. This is what takes place in the canning factory. The contents of the can is heated until all bacteria are killed and the can is sealed to prevent any live bacteria floating in the air from coming in contact with the contents of the can.

When the temperature is raised sufficiently high to kill only the ordinary bacteria and not the spores we have only accomplished what is known as pasteurization. When the necessary measures are taken to kill any particular kind of pathogenic bacteria but not all the bacteria, we are said to have disinfected in regard to that particular organism or disease.

Some spores, if by themselves and unprotected, can be killed in a few minutes in boiling water, but to thoroughly sterilize an article it is necessary to boil for a long time to make sure that sufficient heat has got to all the spores. In bacteriological laboratories where it is necessary to be certain that all dishes and test tubes are sterilized within as short a time as possible a hot air sterilizer or steam sterilizer under pressure is used. In both cases the temperature can be raised above the boiling point of water. The superheated steam method gives a moist heat and the temperature is more easily conducted than in the dry hot air sterilizer.

A temperature of 255 degrees Fahrenheit or 43 degrees above boiling point for fifteen minutes is sufficient to kill all bacteria in both stages if the heat can get to them. The method generally adopted in the laboratory is to heat to about 300 degrees Fahrenheit for one hour, or if in a hurry, for articles that will stand it, to about 390 degrees for half an hour—180 degrees above boiling point.

(Continued in next issue.)

A MATTER OF TECHNICAL KNOWLEDGE.

What are you doing with your spare time? Are you talking blue ruin? Are you going about hour by hour blaming the war, blaming the banks, and blaming everybody for the present depression? Or are you thinking out new schemes to get business? Are you making every hour golden by devoting more time to study? Of course, it may be that you are one of those who think they know everything, or at least enough to scrape through this world.

There are thousands of men in the sanitary and heating business who are doing splendid work who have accomplished much; but at what a cost? Do you ever recall any problem which cost hours of worry, because of the lack of technical education? Look at the thousands of feet of soil pipe which have been wasted owing to lack of knowledge as to how to measure up a stack with allowance for fittings.

Technical knowledge saves material, saves time, worry and lost motion. The writer well remembers a certain journeyman who in his younger days received a splendid education, but somehow or other began to sow his wild oats and finally, in spite of being 18 or 19 years of age, took to the plumbing trade. By the time he was 21 years of age he was a marvel, and would go on a job, take his time, and to the casual observer, would seem as if he was half asleep on the job, but, say, he never made a false move, never scraped the shave hook twice over one spot, and could wipe a joint in a quarter the time of many a man. This man did the greatest amount of work with the least effort to himself, and he spent his nights in study. How are you spending yours?

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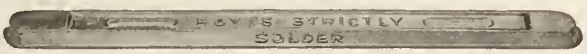

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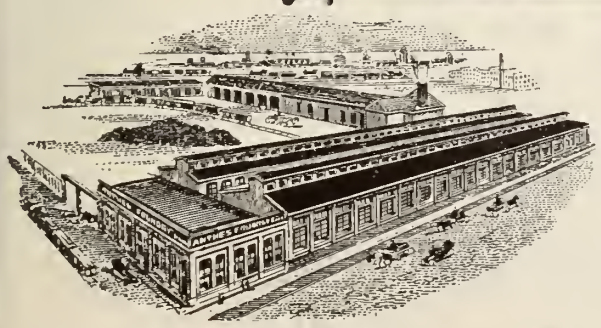

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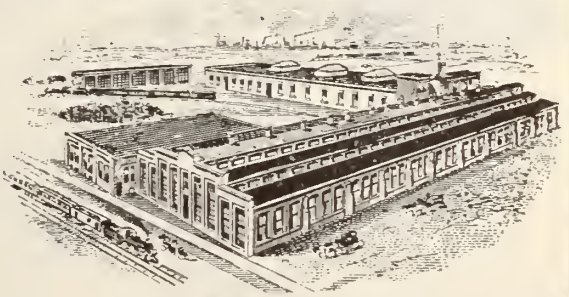

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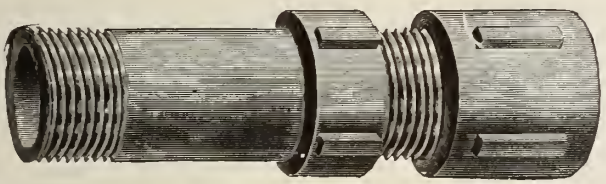

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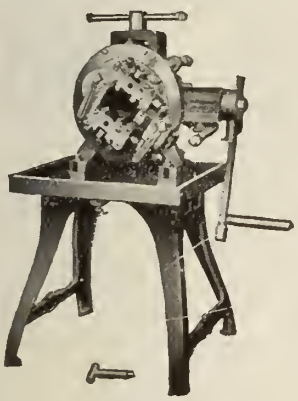

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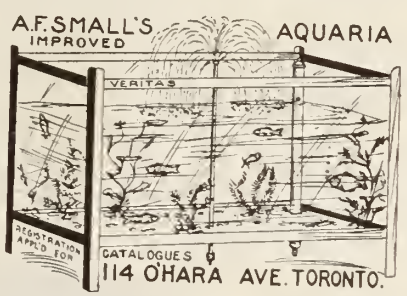

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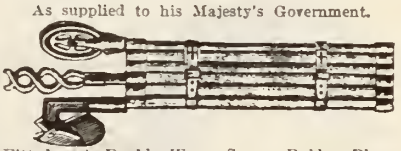

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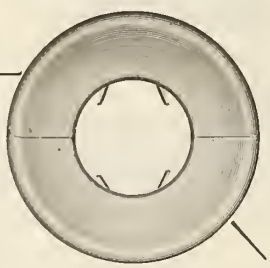

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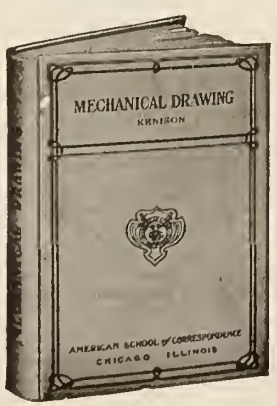

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Heaters.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
The E. S. Manny Co., Montreal.
Warden King, Ltd., Montreal.

Lead.
Empire Brass Mfg. Co., London.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Tallman Brass Mfg. Co., Hamilton.

Lighting Plants.
P. Campbell & Co., St. John, N.B.

Mixing Valves.
Geo. Carpenter, Montreal.
Standard Sanitary Mfg. Co., Toronto.

Nipples.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
C. M. Kemp Mfg. Co., Baltimore.
Empire Brass Mfg. Co., Ltd., London.
Fittings, Limited, Oshawa.
Galt Brass Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallacehurg Brass Mfg. Co., Wallaceburg.
Warden King, Ltd., Montreal.

Oil Storage Systems.
National Equipment Co., Ltd., Wabash Avenue, Toronto.

Packing.
Canadian Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden, King, Ltd., Montreal.
Steel Co. of Canada, Montreal.

Pipe Joint Compounds.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Pipe Threading and Cutting Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., New Britain, Conn.

Porcelain Ware.
Amherst Foundry Co., Ltd., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope, Ont.
Standard Sanitary Mfg. Co., Ltd., Toronto.

Pumps.
C. A. Dunham & Co., Ltd., Toron.
National Equipment Co., Toronto.
General Machinery Co., Ltd., Mulock Ave., Toronto.
Cluff Bros., Church St., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Radiators.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn.

Radiator Fittings.
Fittings, Limited, Oshawa.

Radiator Traps (Steam.)
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
C. A. Dunham & Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Wabash Ave., Toronto.

Solder.
Hoyt Metal Co., Toronto.

Steam Specialties.
Dart Union Co., Ltd., Toronto.
C. A. Dunham & Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.
The E. S. Manny Co., Montreal.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
C. A. Dunham Co., Ltd., Toronto, Ont.
E. S. Manny Co., Montreal.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Testing Plugs.
James Morrison Brass Mfg. Co., Toronto.
C. M. Kemp Mfg. Co., Baltimore.

Tools.
Armstrong Mfg. Co., Bridgeport, U.S.A.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tap & Die Co., Ltd.
Hall & Sons, Ltd., Brantford.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Nicholson File Co., Port Hope, Ontario.
William Johnson, Newark, New Jersey.
Williams, J. H., & Co., Brooklyn, N.Y.

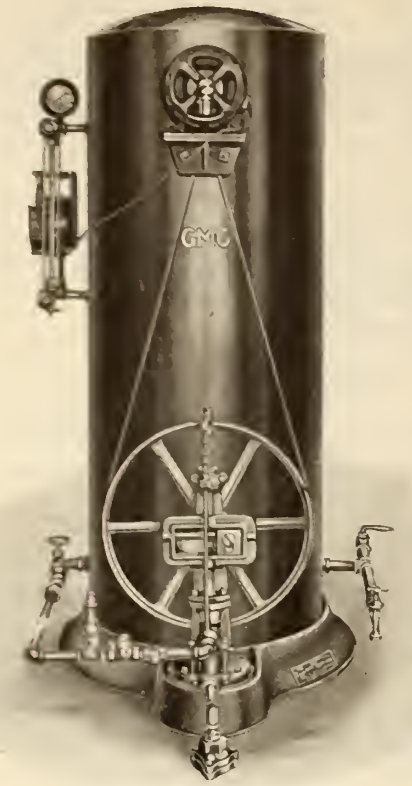
Unions.
Dart Union Co., Ltd., Toronto.
Fittings, Limited, Oshawa.

Vapor Heating Systems.
C. A. Dunham Co., Ltd., Toronto.

Vitro Tanks.
Cluff Bros., Ltd., Church St., Toronto.
Cluff Manufacturing Co., Ltd., Toronto.
James Robertson Co., Ltd., Toronto.

Vacuum Systems of Heating.
C. A. Dunham & Co., Ltd., Toronto.

Water Supply Systems.
Ashdown Hardware Co., Ltd., Winnipeg.
The General Machinery Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Wabash Avenue, Toronto.



G.M.C. Water Systems

The "G.M.C. Special" Nos. 21 and 22

Absolutely the best value ever offered in an Automatic Electric Water System.

Complete in every detail.

Two Capacities.
⅛ H.P.—100 Gal. per Hr.
¼ H.P.—200 Gal. per Hr.

Three Sizes of Tanks.
120 Gal., 220 Gal., 315 Gal.

These systems are furnished complete as shown—Shipped knocked-down—Can be installed by a competent man in one hour.

One Sale Means Another.

The General Machinery Co., Limited 22 Mulock Ave., Toronto

The Most Popular Gate Valve on the Market

Type "K"
BRASS GATE VALVE
Screwed—Fig. 300

JENKINS BROS.' TYPE "K" GATE VALVES

"MADE N CANADA"

THESE valves are very carefully designed; the metal is equally distributed, and they have great strength. In the construction of the discs is employed a combination of the solid wedge and the split wedge principles, producing a mechanism which is unequalled for ease of operation and perfect closing. The discs are carried on a spindle-nut, so constructed as to act as a wedge at the point of closing, and at the same time allowing a certain amount of flexibility—permitting the discs to seat perfectly, even should there be a slight derangement of the angle of the seats. Unlike the solid wedge type, the discs cannot jam in the valve body, for the first movement of the spindle loosens the discs, and the guides in the body remove them from the seat faces.

STOCKED BY DEALERS EVERYWHERE.

CATALOGUE MAILED FREE UPON REQUEST.

JENKINS BROS. LIMITED

103 ST. REMI STREET - - - MONTREAL

"When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."

Dart Union
Pipe Coverings

BRONZE TO BRONZE
AT THE JOINT

The Dart Union's ball-shaped seat allows for an easily made and perfectly tight connection whether pipes are in or out of alignment.

The DART'S EFFICIENCY IS PRACTICALLY EVERLASTING because the bronze faces cannot deteriorate and the heavy iron parts will not stretch or pull apart.

Use the Dart on **all** pipe work and you'll give the satisfaction that will get you more **repeat** contracts.

ORDER FROM YOUR JOBBER.

A Dart Union will be promptly replaced two for one if not right

Manufactured by Dart Union Co., Ltd., Toronto, Canada

KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

This plant is at your service.
Help us keep it busy.

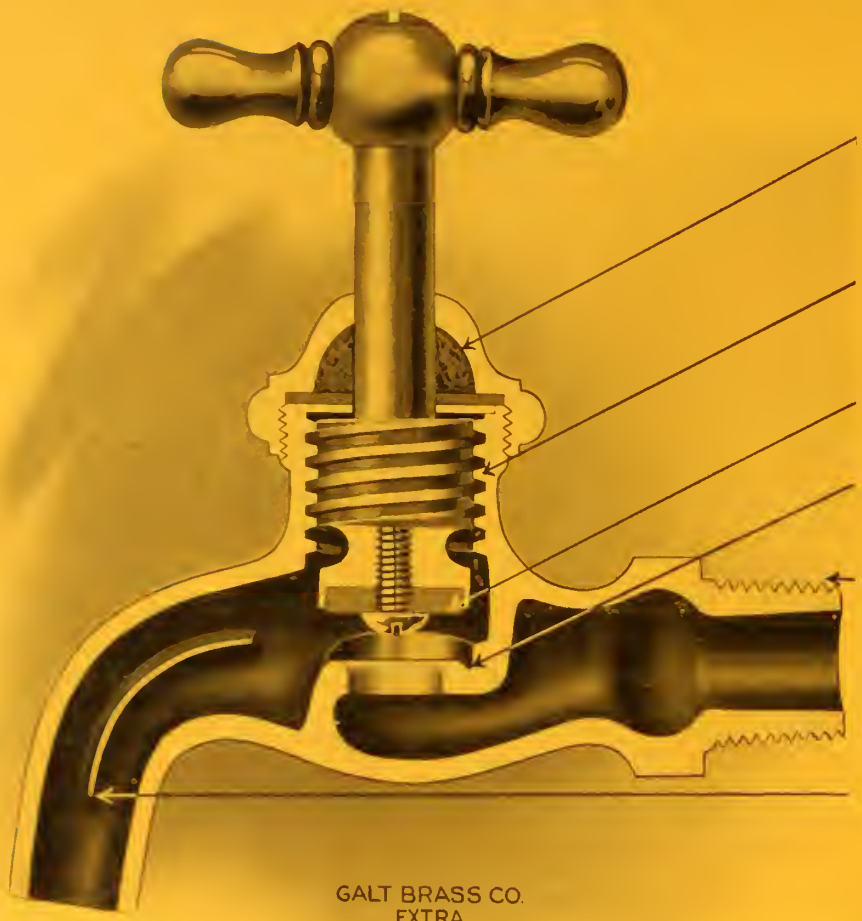
REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

Quickest possible deliveries. **Consistent Prices.** Best quality of goods. **Write for Catalog No. 5.**

The Kerr Engine Company, Limited Walkerville, Ontario

Valves and Hydrants Exclusively

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

REPORT OF ONTARIO CONVENTION

THE SANITARY ENGINEER

PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX Publication Office : TORONTO, MAY 1, 1915 No. 9

THE "COLONIAL"

A Popular, High-Class Pedestal Lavatory

The Slab is of an Ornamental Pattern, not elaborate, but of a quiet, dignified design that appeals to discriminating purchasers.

The "Colonial" is made in the popular 22"x27" size with 11¾"x14¾" Oval Bowl and 4½" Apron.

COLONIAL—PLATE F109

COLONIAL—PLATE F109½

Not illustrated in Catalog "F"

NOTE: "L" Drilling (Patent Overflow) can also be furnished.

The Standard Ideal Company Limited

General Offices and Factories: Port Hope, Canada

TORONTO	MONTREAL	WINNIPEG	VANCOUVER
119 King St. East	42 Beaver Hall Hill	80 Lombard St.	410 Carter Cotton Bldg.

Beaver Brand
Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co.,
178 Victoria St., Toronto

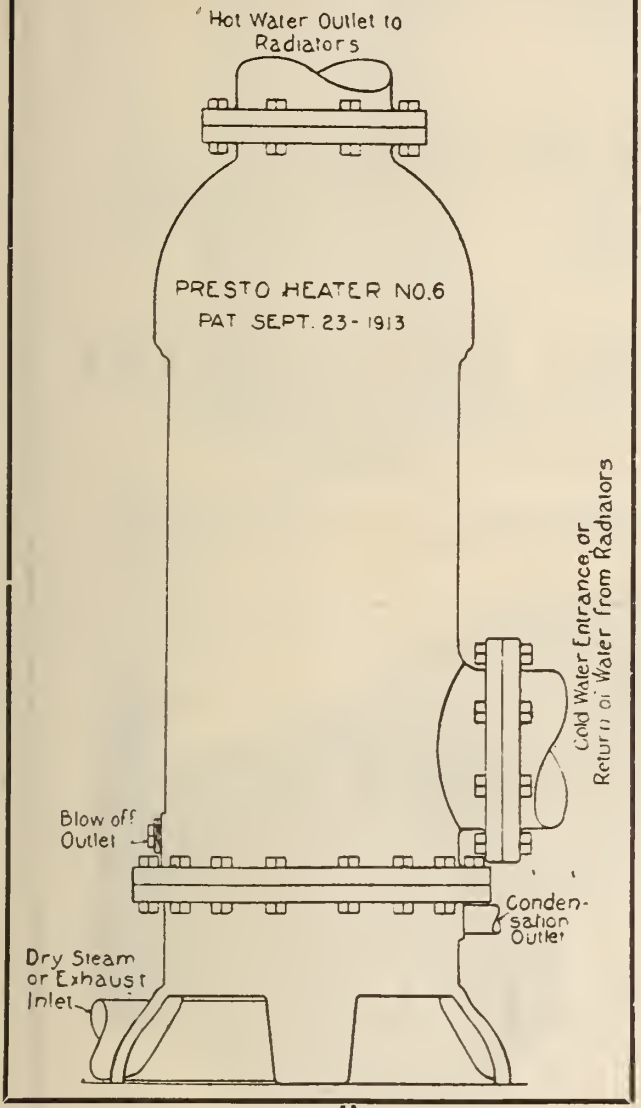
MANITOBA and NORTHWEST:
E. B. Plewes,
120 Lombard St., Winnipeg

BRITISH COLUMBIA:
A. O. Campbell,
864 Cambie St., Vancouver

A Challenge

To Heater Manufacturers

Presto Heater


Hot Water Outlet to Radiators
PRESTO HEATER NO.6
PAT SEPT. 23-1913
Cold Water Entrance or Return of Water from Radiators
Blow off Outlet
Condensation Outlet
Dry Steam or Exhaust Inlet

"The Presto Heater will effect an economy of 25% in comparison with any other heater on the market."

We will deposit

$500.00

to be presented to any charitable institution if any manufacturer of a heater can disprove this statement.

We want to make a public test on any building in the Dominion of Canada.

If the PRESTO HEATER does not prove itself to be 25% cheaper in operation, giving the same heat, we will pay the five hundred dollars to any charitable institution that may be agreed upon, and in addition, we will pay all the costs of the test.

The use of a PRESTO HEATER delivers the best kind of heat and for hot water supply assures an irreproachable service, however irregular the consumption. It gives the hot water at the desired temperature, instantaneously, and in practically unlimited quantities up to 5,000 gallons per hour.

During the past two years there have been twice as many PRESTO HEATERS sold and installed in Canada than all other kinds and makes of heaters combined.

WRITE FOR FULL PARTICULARS

HARRIS CONSTRUCTION CO., LIMITED

120 Sanguinet Street, MONTREAL

WHAT DOES B-O-T MEAN?

is a question we are often asked

B-O-T stands for the initials of the president of all the B-O-T organizations in the States and Canada.

——It Also——

Stands for a High-Grade Water Closet

which costs you no more than any other but carries a 5 Year Guarantee.

The B-O-T Mfg. Co., Limited

B-O-T BUILDING

159-161 Richmond St. West, TORONTO

Vancouver Agents:
The Robertson-Godson Co.

Edmonton Agents:
Carroll-Wilson Co., Ltd.

Winnipeg Office:
J. H. Leonard
405 Tribune Building

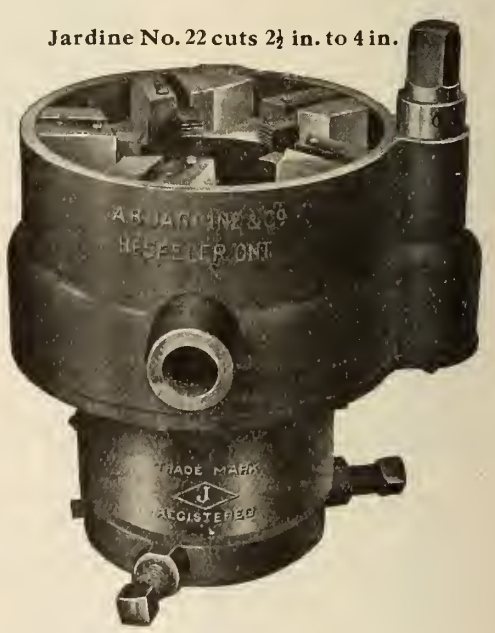
"Jardine" and "Toledo"

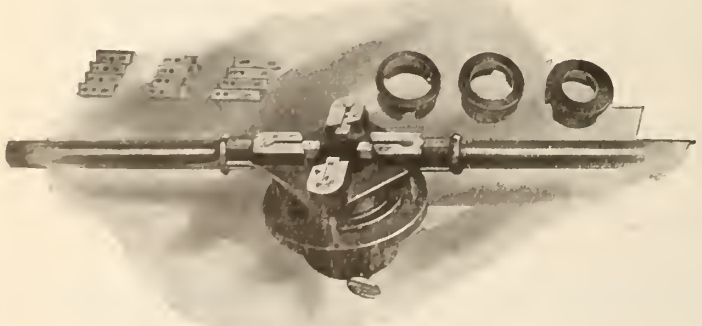
PIPE THREADING TOOLS

Made in Canada

Do the very best work.
Do it in less time.
Cost you less for repairs.
They are the tools to buy.

Jardine No. 22 cuts 2½ in. to 4 in.





Toledo No. 1 cuts 1 in. to 2 in.

Ask for our new Pipe Die Catalogue.

A. B. JARDINE & CO.

Hespeler, Ontario

Sole Makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.

Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man
Brockville and East—J. R. Devereux, 142 St. Joseph Boulevard West Montreal, Que.

MADE IN CANADA

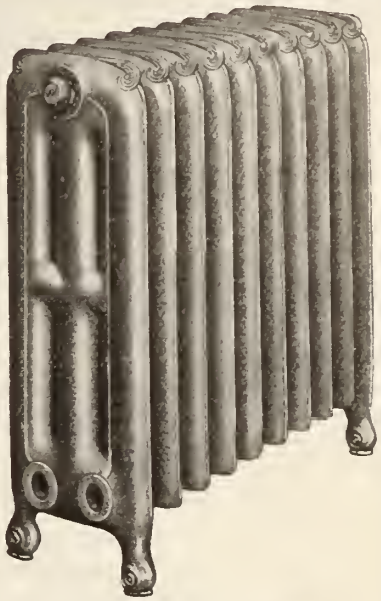
The Daisy Boiler

55,000 Daisy Boilers in use, all giving satisfaction.

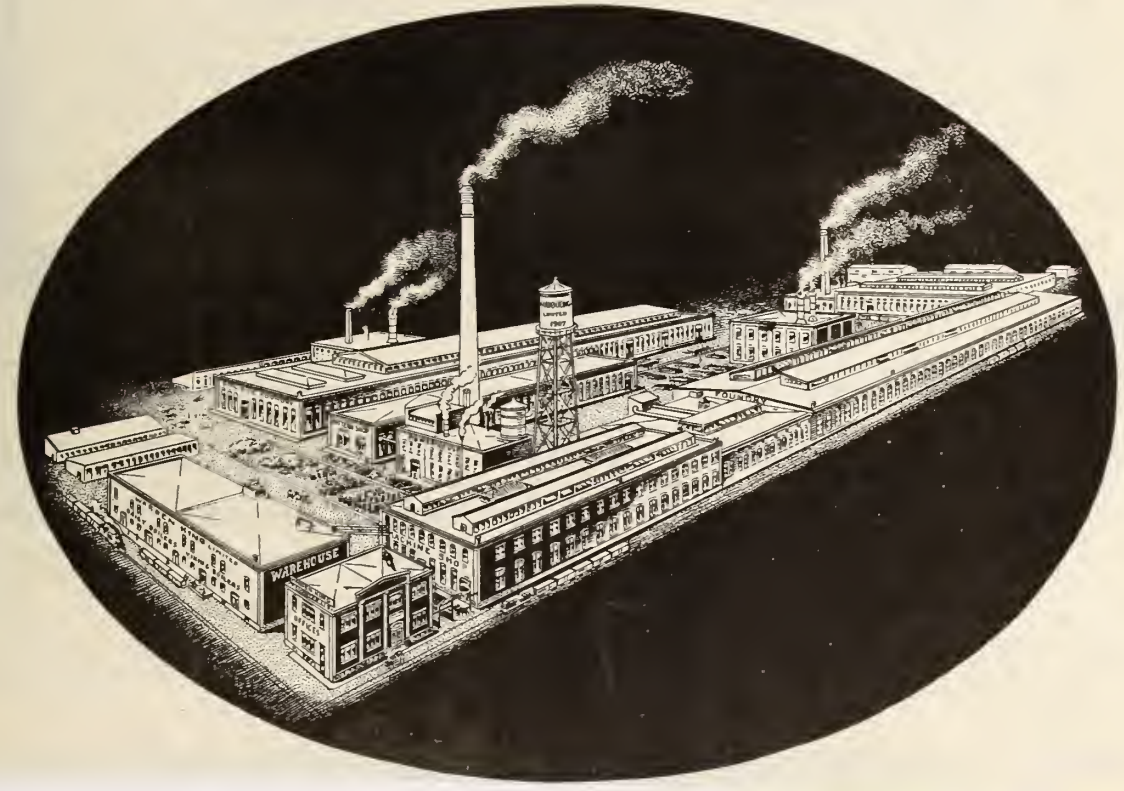
Easiest to install.

Easiest to operate.

See our 1915 Boiler with Improved Grates.



Viking Screw Nipple Radiators (All Sizes)



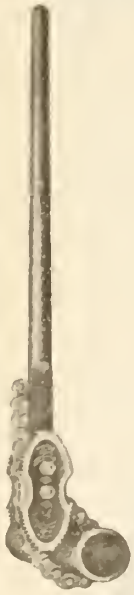
WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal



Williams Chain Pipe Tools

are guaranteed to provide for unusual service and you will never go wrong if equipped with them for any work in their line. No substitute ever has or will serve you as thoroughly and as often.

Improved "Vulcan"
Double Ended Reversible Jaws. "Two Tools in One at the Price of One" for Pipe Work.

"Agrippa"
with Single Jaw and Flat Chain, an excellent tool for close-quarters in Pipe and Fittings work.

Send for Pipe Tools Pamphlet

J. H. WILLIAMS & CO.
Superior Drop-Forgings
77 Richards St., Brooklyn, N.Y.

Branch Factory
Buffalo N.Y.

Turn Your Spare Time Into Good Profit

Learn to be an EXPERT in Plumbing, Sanitary Science and Engineering

Be among the men in the trade who get paid for what they KNOW, not for the hard work they do.

Does not interfere with your present position. **You study at home** and when our course is completed, you are eligible for membership in the American Society of Sanitary Engineering, without further examination.

Start in right now to prepare yourself for a better position and **more salary.** Our course is complete and practical and the fee reasonable.

Before turning over this page, write for our **Free Booklet** and full particulars. Costs but a cent and will mean dollars to you.

THE ANGLO-AMERICAN SANITARY CORRESPONDENCE COLLEGE
Professor [illegible]

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

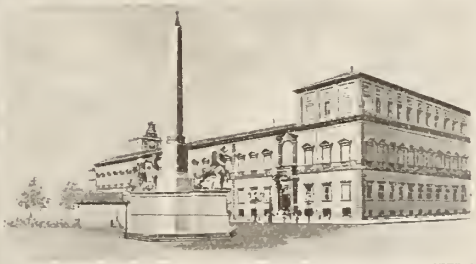
Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

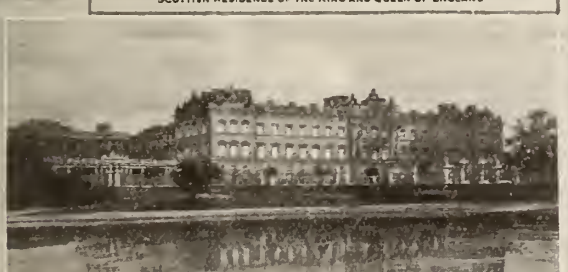
TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND



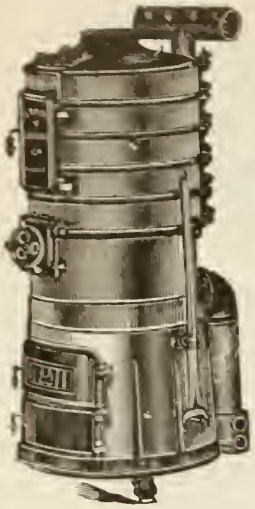
THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY ROME



BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

"MADE IN CANADA"

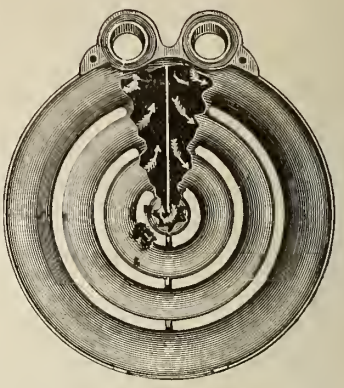


The quickest and most economical.

The "New Star"

Hot Water Heater

The most improved on the market. The only Heater having a *Tubular section* giving one-third more heating capacity than any Flat Section Heater, and dividing the water, making it easier heated.



Section absolutely unbreakable.

Manufactured by

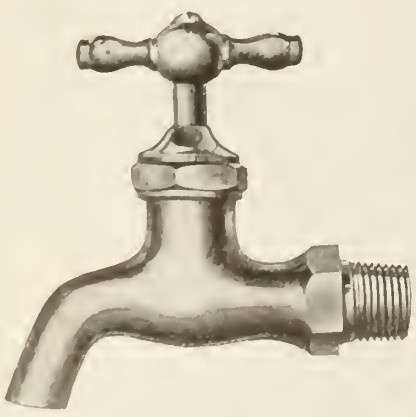
The Star Boiler & Radiator Company, Limited

New Premises: 1353 St. Lawrence Blv'd, MONTREAL

WOLVERINE COMPRESSION BIBBS

Red Brass
Polished or Nickel Plated

GUARANTEED



Furnished with Tee Handle as per cut and with Brass or China Index Lever Handle.

Spout has proper angle to throw the water outward into Dish or Pail, no matter how close to wall or sink back the bibb is installed.

Swivel stem insures long life to washer, as it cannot grind on seat.

Positively the best bibb on the market for the price.

MADE IN CANADA

BY THE

Canadian Wolverine Company, Limited

CHATHAM, ONT.

PEERLESS

WATER SYSTEMS

We'll Lend You Cuts

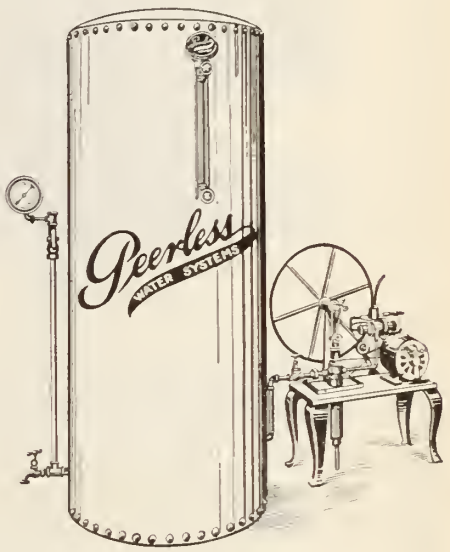
Important! A new discount

Until further notice the discount from the prices shown on gasoline engine-operated systems will be increased 10%, making it the same as the discount applying to hand-operated systems.

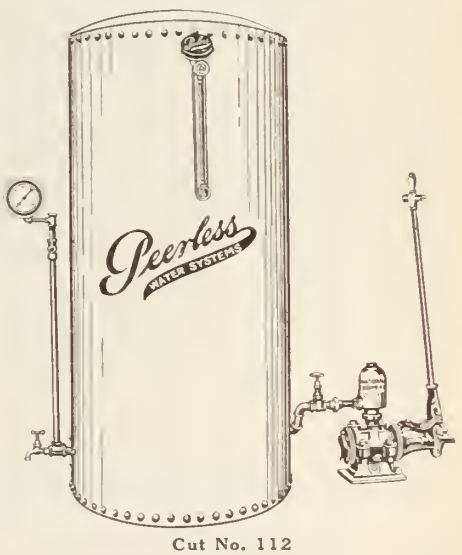
You read our advertising--others will read yours--we'll both profit.

The three cuts shown below are examples of what plumbers all over the country are using.

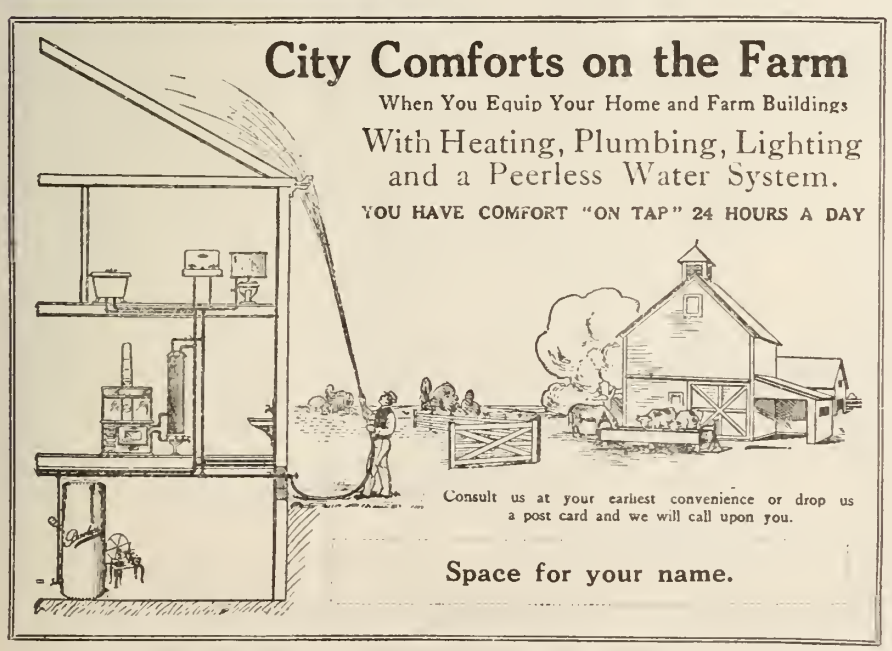
We'll be glad to help you.



Cut No. 300



Cut No. 112

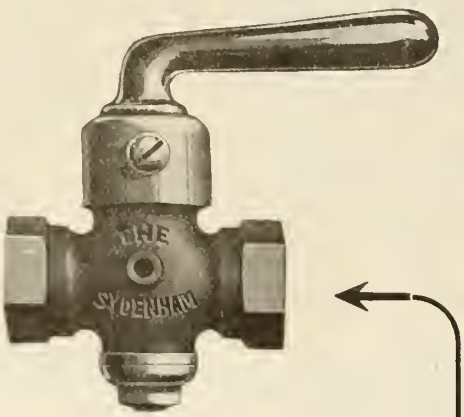

City Comforts on the Farm
When You Equip Your Home and Farm Buildings
With Heating, Plumbing, Lighting and a Peerless Water System.
YOU HAVE COMFORT "ON TAP" 24 HOURS A DAY
Consult us at your earliest convenience or drop us a post card and we will call upon you.
Space for your name.

Cut No. 325

National Equipment Co., Limited

Wabash Avenue - Toronto, Canada

To the Sanitary Engineer



No. 4044

If you want Ground Key Stops and Stop and Waste Cocks that will give entire satisfaction to yourself and customers the

SYDENHAM BRAND

will supply your need.

Extra Heavy.

Made of virgin metal.

Every piece guaranteed.

Sold by leading Jobbers.

Made by

THE WALLACEBURG BRASS & IRON MANUFACTURING CO., LIMITED

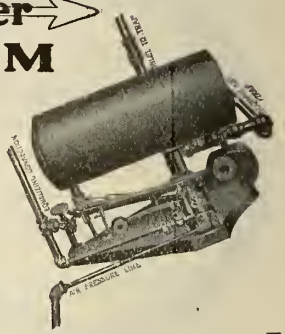
WALLACEBURG, ONTARIO

Winnipeg,
Moncrieff & Endress, Ltd.
Scott Bldg.

Toronto,
L. N. Vanstone,
8-10 Wellington St. E.

Montreal,
J. R. Devereux,
142 St. Joseph Boulevard West

Morehead Back to Boiler SYSTEM



GO OUT OF YOUR WAY to please a customer **once**—And you have made a dent in his memory which will be there for years' to come.

You have increased your capital by an asset which will survive the trials of fires, floods and depressions.

On every installation which involves the use of steam **in any way** you can realize a handsome profit—and what is more important—make a delighted customer by furnishing a **sure**, simple solution of the annoying CONDENSATION problem.

The peculiarity of the particular job you have will only bring out the

Wide Application

of the Morehead line.

The RETURN TRAP removes all condensation from heating, drying, and cooking apparatus—and returns it direct to boilers regardless of the difference in pressure (between the apparatns drained and the boiler) or whether the apparatus is located above or below the water line.

The CONDENSER TRAP combines the features of the Morehead Return Trap and a Jet or Spray Condenser. It is especially adapted to service on exhaust steam and reduced pressure heating, cooking, and drying apparatus.

The VACUUM TRAP automatically removes all condensation from exhaust lines and oil separators operating under a vacuum—**without affecting the vacuum in any way.**

The NON-RETURN TRAP is particularly designed for the removal of Condensation from high or low pressure mains, driers, heaters, etc., and delivers the water to an open tank, hot well, or feed water heater.

YOUR interests and OURS are **one**. Your permanent prosperity means our continued success.

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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, MAY 1, 1915 No. 9

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JH	1411	30x8	295	195	2	37SA	1150
JH	1412	36x8	420	280	2	37SA	1350
JH	1413	36x10	525	350	2	37SA	1530
JH	1414	42x10	720	480	2	37SA	2150
JH	1415	42x14	1000	665	2	37SA	2675

Outfit may be furnished with any size tank desired.
Order by outfit number and state whether for shallow or deep well.
Capacity Pump, 360 gal. per hour.

SIZES AND CAPACITIES.

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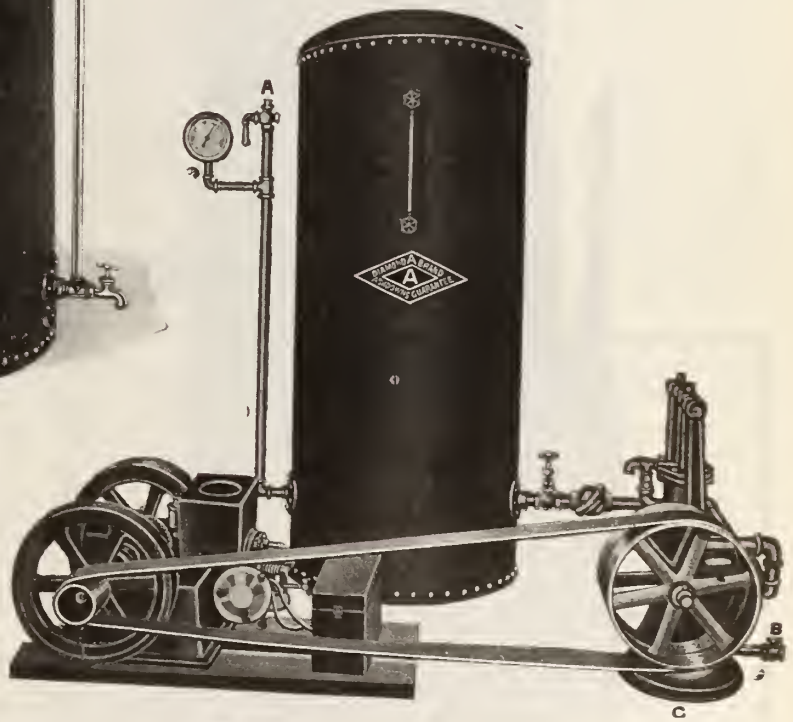
JH	1416A	30x8	295	195	2	100J.H.	1250
JH	1417	36x8	420	280	2	100J.H.	1450
JH	1417A	36x10	525	350	2	100J.H.	1630
JH	1418	42x10	720	480	2	100J.H.	2250
JH	1418A	42x14	1000	665	2	100J.H.	2775

Capacity Pump, 550 gal. per hour.



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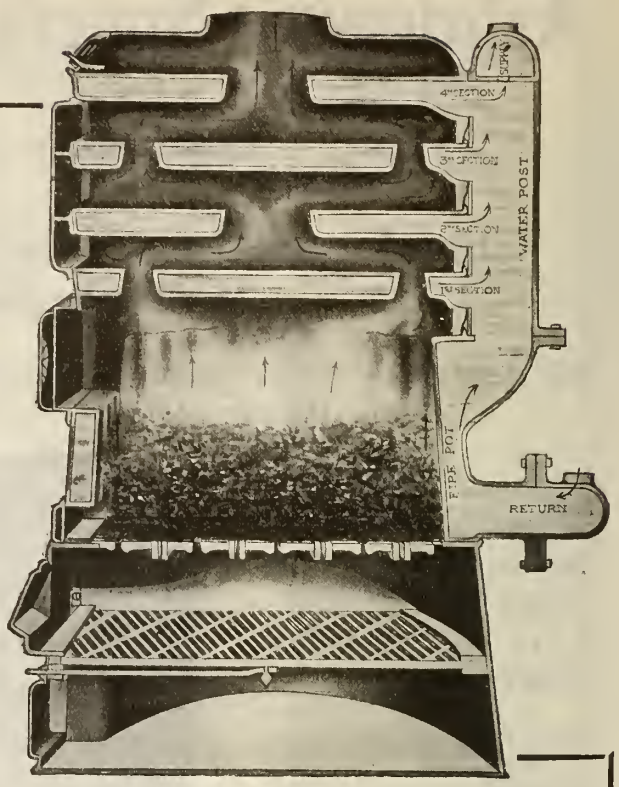

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THE SANITARY ENGINEER

VOL. IX. MAY 1, 1915 No. 9

Heating and Ventilation in a Skyscraper

A Few Items of Interest About the Heating and Ventilation in the New Royal Bank Building, Situated at the Corner of King and Yonge Sts., Toronto.

IN our two previous issues we described two very interesting residence installations. One a rural home, another a city home.

In this issue we purpose giving our readers a few of the most important features in connection with the heating and ventilation installed in the new Royal Bank building, situated at the corner of King and Yonge streets, Toronto.

This beautiful building, a view of which is shown herewith, is said to be the tallest building in the British Empire. It towers to a height of 310 feet from the street level to the tip of the flag pole. There are three floors below the street level, thus from the lowest floor to the highest ceiling cannot be much less than 300 feet.

The basements are used chiefly for boiler rooms, engines, motors and fan rooms. Hot water heaters for domestic purposes. A large condenser is used to cool any water which may be necessary to blow off from the two boilers, as the Toronto board of health do not allow steam boilers to be blown off direct into the public sewers.

A large Sump pump is installed in the boiler room, and is operated by air which is furnished by a pair of automatically controlled electric air compressors, furnished by the Blaisdell Machinery Co., Bradford, Pa. All the machinery is situated on a floor higher than the boiler room to the left. In this room is also situated a pair of direct connected centrifugal pumps driven independently by two 40 horse power electric motors furnished by John McDougall Co., Montreal. These pumps are required to pump the domestic water supply to all floors above the tenth story. The 10 lower floors being furnished with water direct from the city mains. In connection with these pumps there is a large auxiliary supply tank in the basement; to furnish water in case the city pressure be turned off for some reason or other. Then, of course, the pumps deliver the water into a large steel tank at the top of the building. On the opposite side to the pumps is situated a large air washer and conditioning apparatus, which not only washes, but also warms and humidifies the air. This is in connection with the Vento system of indirect heating all of which is used only in the banking premises. There is about 3,000 square feet required for this portion of the building. The rest of the building is heated by 22,000 sq. feet. of direct radiation furnished by the Dominion Radiator Co., Ltd., Toronto.

Royal Bank, corner of King and Yonge Streets, Toronto.

It might interest our readers to know that the approximate weight of this radiation is about 120 tons. Over 5 miles of piping was used for the heating only. The ventilation system, which included all the local vent from the lavatories, required over 25 tons of galvanized iron, besides about 5 tons of black sheet iron used in the fans, air washers and smoke stacks.

All the fans throughout the building were supplied by Keiths Limited, Toronto, and all the electric motors, were furnished by the Canadian General Electric Co., Toronto, with the exception of one which operates the local ventilating exhaust fan, which was furnished by The Bruce Peebles Company, Ltd., Scotland, this being a variable speed motor.

Six electric elevators are installed, which were furnished by the Otis Fensom Co., Toronto, and require from 25 to 35 horse power each to operate them.

Boilers

The heating system is furnished with steam by two (2) steam tubular boilers 72 inches in diameter, 16 ft. long, each containing 132 3-inch lap-welded boiler tubes. Man holes were made of pressed steel yokes and frames, double riveted, running lengthwise at 90 degrees with the length of boilers.

Each boiler is suspended by four heavy hangers, with steel plate pads riveted to the boiler, for suspension from steel cross I beams.

The shell of the boilers is 7/16 inch in thickness and the heads are of 9/16 inch steel. Seams are triple riveted, butt-joint type with 3/8 inch thick inside and outside straps, and all rivets were 7/8 inch diameter.

In constructing the boiler all the holes were punched 3/16 in. less than size of rivets and then carefully drilled a snug fit for the rivets used. The boilers were subjected to a hydrostatic test of 150 lbs. per square inch.

John Inglis Co., Ltd., boiler makers, Toronto, furnished them and put them in place again testing the boilers in position, each boiler being 125 h.p.

The grates furnished are cyclone self-locking, heavy pattern and machine finished, the grate area of each boiler being 5 ft. 6 inch by 7 feet long.

All the steam valves were furnished by Jenkins Bros., Montreal, and unions were all supplied by the Dart Union Co., Toronto.

The specifications required that the building be heated to 70 degrees when the temperature outside is 10 below zero, with a 5 lb. head of steam.

The various steam mains were connected to the boilers by a pair of heaters, thus making it possible to turn off any section of risers at the boiler.

Ventilating System.

The fan furnishing the fresh air supply with the building is provided with

FRESH AIR SUPPLY FAN—TABLE NO. 1.

Rooms.	Cubic ft. air per minute.	No. of inlets.	Size of ducts.	Size of registers.
Basement and Ground Floor—				
Bank Storage	118	1	6 x 6	6 x 12
Toilet	360	1	5 x 14	14 x 14
Locker room	978	1	24 x 6	24 x 18
Locker room	...	1	10 x 8	10 x 20
Savings bank	1,500	6	12 x 5	12 x 12
Entrance to bank	1,000	1	30 x 8	30 x 22
Mailing dept.	266	1	8 x 8	8 x 20
First Floor—				
Banking room	4,464	1	12 x 10	15 x 24
" "	...	12	6 x 8	8 x 15
" "	...	2	20 x 9	20 x 24
Telephone booth	36	1	6 x 3	6 x 6

Total fresh air supply, 8,722 cubic feet per minute.

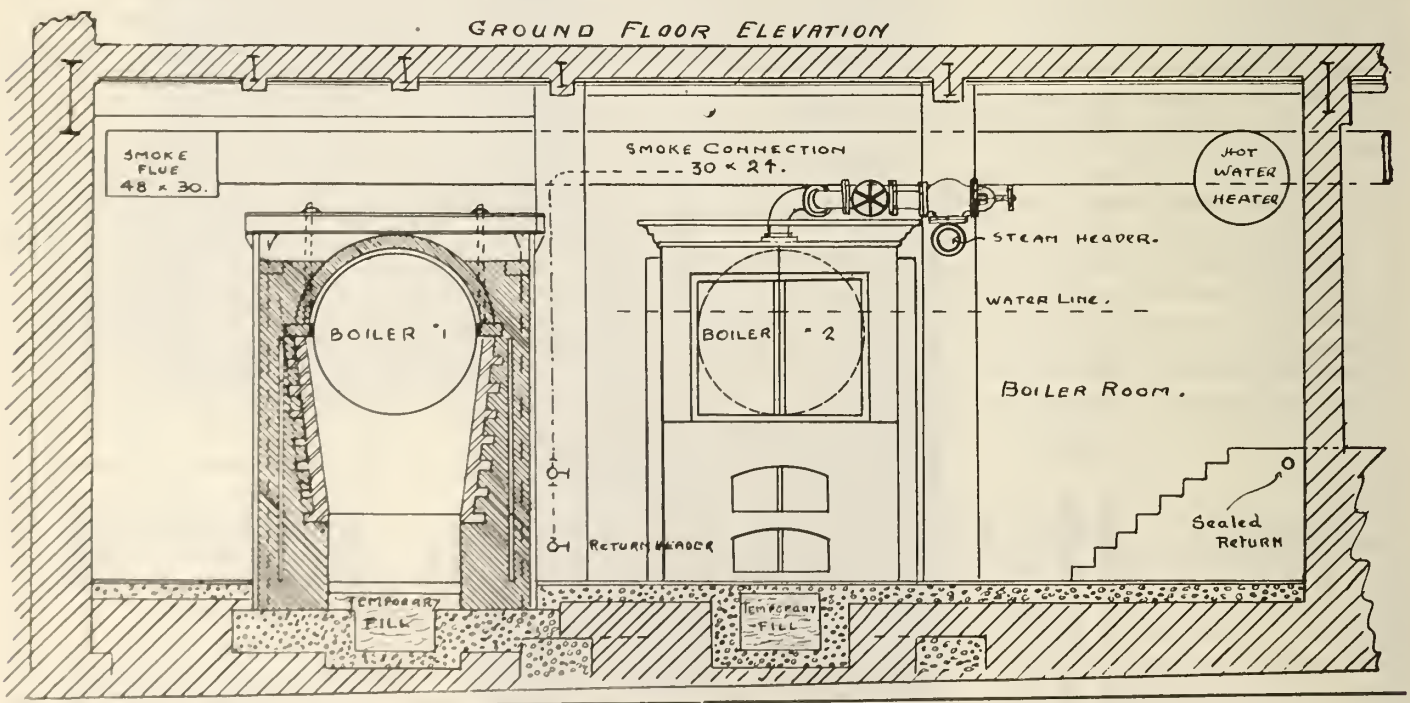
TABLE NO. 2.—AIR EXHAUST FAN.

Rooms.	Cubic ft. air per minute.	No. of outlets.	Size of ducts.	Size of registers.
First Floor—				
Banking room	3,000	14	10 x 5	10 x 10
Ground Floor—				
Toilet room	720	10	4 x 4	6 x 4
Locker room	1,467	4	12 x 6	12 x 12
Savings bank	1,000	1	15 x 7	15 x 15
" "	...	1	12 x 12	12 x 12
Mailing Dept.	266	1	8 x 8	8 x 12
Bank storage	118	1	6 x 6	6 x 12

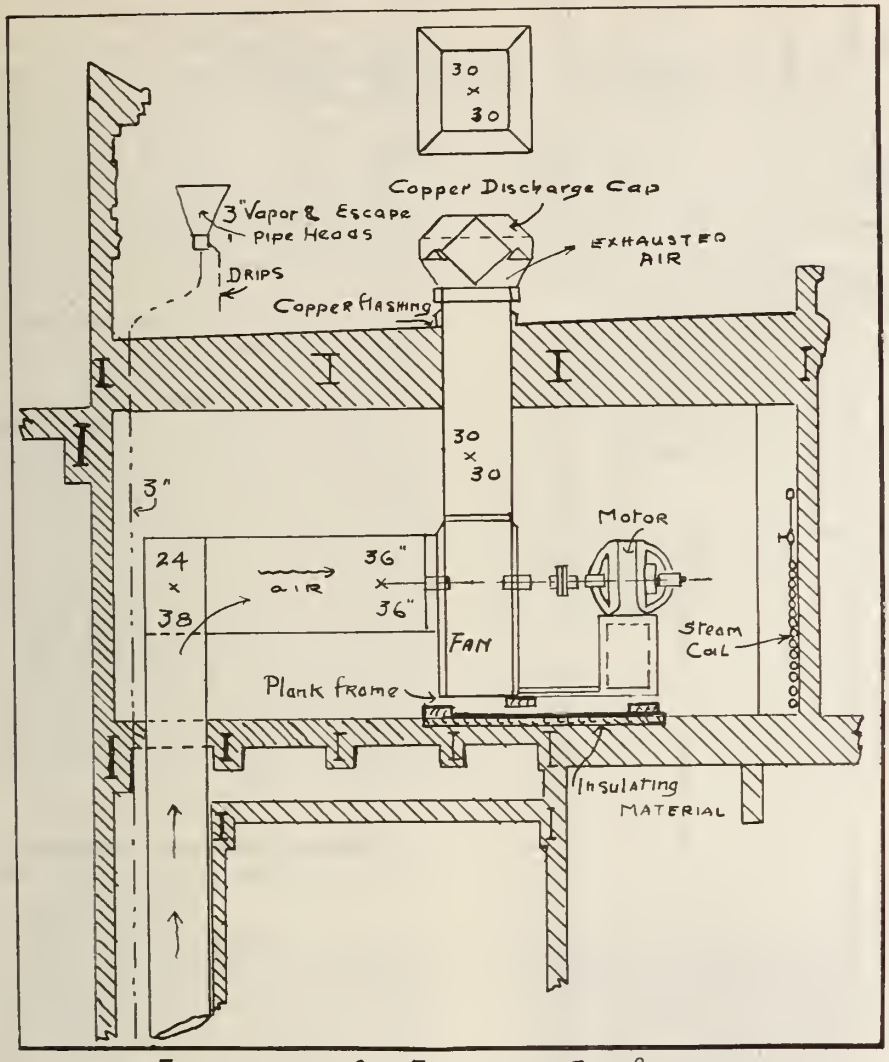
Total air exhausted 6,571 cubic feet per minute.

TABLE NO. 3.

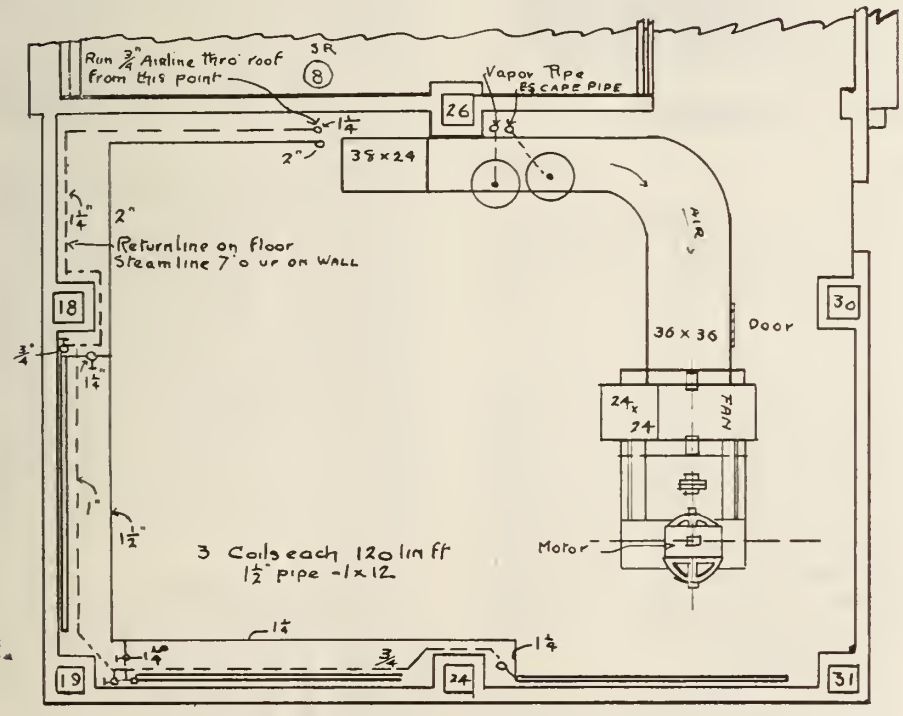
Fans	Diameter of wheel	Type of Discharge	Cubic foot air per minute	Rev., per min., approx.
Supply	27 inch	Top vertical	8833	470 R.P.M.
Exhaust	24 inch	Top vertical	7280	480 R.P.M.



Elevation of boiler fronts and setting. This boiler room is cool and comfortable, showing that all heating surfaces are well insulated.



ELEVATION OF EXHAUST FAN & MOTOR.



PLAN OF EXHAUST FAN & MOTOR

inlet through a cold air chamber tempering coils, air washers and re-heating coil and fan.

The discharge from this fan rises up and runs across the ceiling of the basement, and branches are taken from the horizontal flues at the ceiling of the basement and connected under various tables as indicated by table number one.

The exhaust fan takes the foul air from the building as shown in table No. 2.

This fan is situated in the pent house at the top of the building and is connected to a main duct 38 x 24 inches, the fan being 36 inches in diameter, exhausting into a 30 x 30 inch copper exhaust cap.

In the above tables will be seen the number of inlets and outlets which are required for the proper ventilation of all the rooms mentioned including the local ventilation for the toilet rooms. Such a system of local ventilation is positive and not dependent upon climatic conditions.

The determination of volume was made by annometer readings taken from the faces of each register. Opening installed, and were required to comply with the above tables before being taken over by the owners.

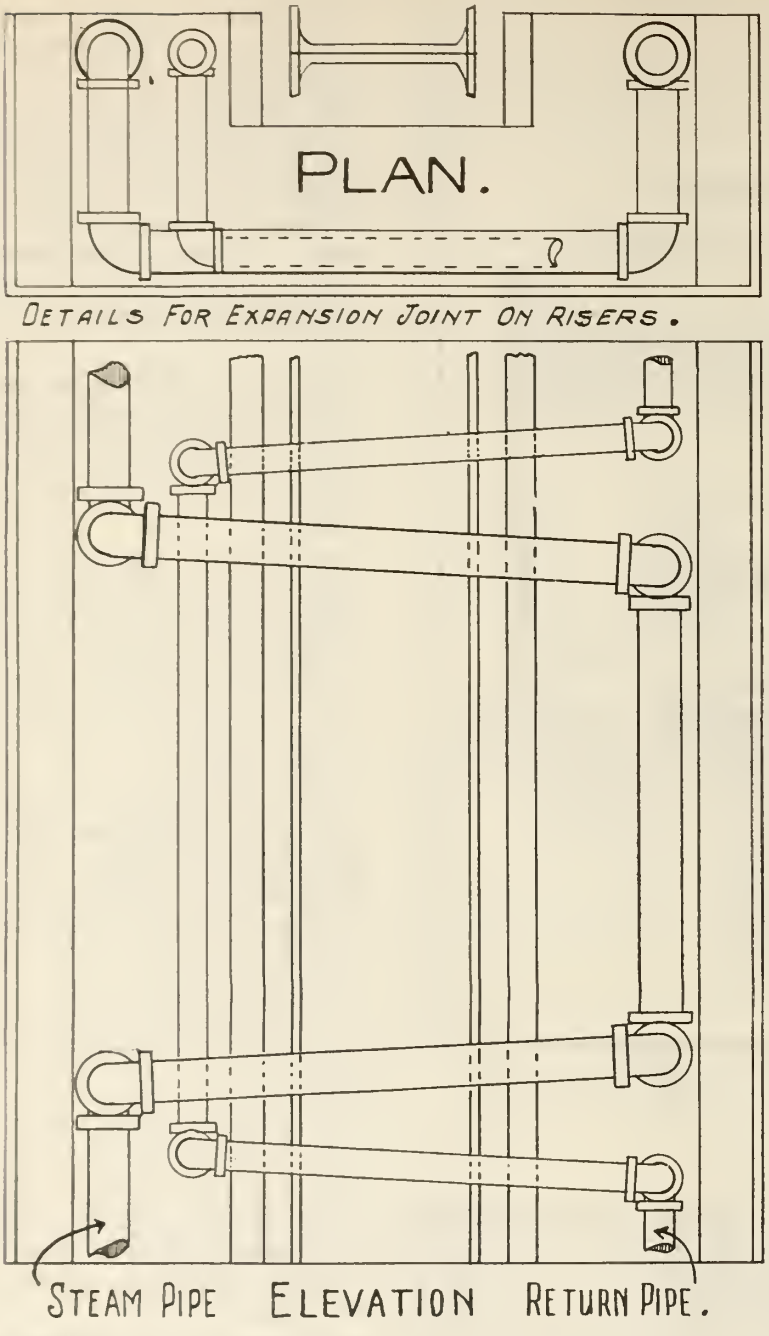
The material used for the whole ventilation system was, galvanized iron for the supply and discharge pipes 18 gauge.

The discharge cap at the top of the roof being made of 32 oz. copper. Tight fitting doors are placed at various locations in both the inlet and outlet ducts.

All these indirect ducts were made of 18 gauge galvanized iron well braced with angle iron.

The coal consumption is another item which has received a lot of consideration, and every unit of heat is made to do duty. The boilers are well covered with high grade covering, all the piping also being covered. This insulation was furnished by The Canadian Johns-Manville Co., Ltd., Toronto. In the boiler room there is a hydraulic ash hoist fitted up, and, in all, the whole installation is about as neat a one as has come to our notice for some time.

The heating contractors to whom we are indebted for the loan of blue prints, etc., were Messrs. Baker, Smith & Co., heating and ventilating engineers, New York, 123 Bay St., Toronto. James I. O'Sullivan, their Toronto manager, superintended the installation during construction.



Plan and elevation of risers in heating system installed in Royal Bank Building, Toronto.

MADE IN CANADA.

A COMMITTEE of the Canadian Manufacturers' Association is endeavoring to raise money to advertise Made-in-Canada goods. In theory the proposal is excellent but in practice is it really wise? Most Canadian manufacturers take a pride in their products, put their names on them and turn out something that is equal to and in not a few cases superior to anything of the kind produced in the world. On the other hand there are some Canadian manufacturers who unfortunately think their own interests are best served by making the cheapest and most inferior article they can force upon the buying public. They think a slightly better immediate profit is better than building up a reputation for high-grade goods. These experiences and the exposures in connection with inferior qualities supplied to fill war orders show that there are some Canadian manufacturers who ought to be behind the prison bars as the Premier suggests.

Even members of the committee recognize this weakness. Only the other day one of them placed an order amounting to several thousand dollars with a United States firm though the same products are made by another member of the association in a near-by town. The first manufacturer would much prefer to buy Canadian make but he knows from costly experience that his neighbor is too indifferent to take pains and turn out a satisfactory quality.

A general campaign of advertising Made-in-Canada goods would be paid for largely by the firms who are making high-grade goods, while the benefit of such a general campaign would be derived chiefly by the men who are trading on Made-in-Canada reputation and producing inferior goods to sell at slightly lower prices.

The committee of the Canadian Manufacturers' Association would be far better occupied and could do more real good for Canadian manufacturers if they were to devote their energies to improving the quality—by moral and other influences—of the goods produced by the scoundrels who would injure the good name of the reputable Canadian manufacturers.

Canadian manufacturers who produce an article of which they are proud, behind which they will stand, should let the public know of it. They should advertise it extensively over their own names and not pay and be sponsors for the firms who have no care for their own or our national reputation. On the other hand the newspapers should, as far as possible, refuse to insert advertising of any but satisfactorily made products and by their editorial policy make it unprofitable for the chronically disreputable manufacturers to stay in business.

POSTAL LAWS OF CANADA.

Post Office Department,
Ottawa, Canada.

Under the Post Office Act, Sections 65 and 66, the Postmaster-General has the exclusive privilege of receiving, collecting, conveying and delivering letters within Canada.

Bills and accounts, whether in open or sealed envelopes, as well as circulars or other printed matter enclosed in envelopes sealed or ready to be sealed, are "letters" within the meaning of the Post Office Act.

There is a penalty under Section 136 of the Post Office Act which may amount to $20 for each letter unlawfully carried.

It has been brought to the attention of the Post Office Department that some business firms desiring to avoid paying the war tax, which became effective on the 15th April, propose making arrangements for the delivery of accounts, bills, circulars, etc., through means other than the Post Office, contrary to the Postal Act, and a warning is hereby given that the Post Office Department intends to insist that the law shall be rigidly lived up to, and will in no circumstances allow these parties to avoid paying the one cent tax which has been imposed for war purposes.

All letters conveyed, received, collected, sent or delivered in contravention of the Post Office Act will be seized and necessary steps immediately taken for the prosecution of the offenders in all cases where the law has been contravened.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 3.

BACTERIOLOGY.

IN canning factories it has been found that some spores are much more resistant to heat than others, and that simple boiling in open tanks will not kill the spores contained by the food in the cans in any reasonable length of time. Closed tanks heated by steam under pressure are now used and temperatures as high as 250 degrees Fahrenheit can be obtained. The higher the temperature the shorter the time required for sterilization, but too high temperatures destroy the flavor of the canned goods. One-half hour at 230 degrees Fahrenheit is generally satisfactory.

Sterilizers are used in hospitals for sterilizing instruments, bandages and cloths and in barber shops for razors and accessories.

Heating to such extreme temperatures as above mentioned would destroy the flavor of wines and change the taste and nature of milk. Pasteur, the French scientist, born in 1822, who did so much for the science of bacteriology, found that when wine was heated from 140 to 150 degrees Fahrenheit all the vegetative bacteria were killed and the flavor was not spoiled. If the spores are then allowed to grow to the vegetative stage and the wine heated again to the same temperature all the spores that have germinated will be killed. If any spores remain these can be again allowed to grow and again heated. This process continued for 4 or 5 days will insure sterilization and no damage will have been done to the flavor of the wine.

Such a process, while advantageous, would be too lengthy and expensive for milk and so it is only heated once to about 140 degrees Fahrenheit. This practically kills all the pathogenic bacteria and if the temperature is subsequently kept below 40 to 50 degrees Fahrenheit the spores of other bacteria cannot develop at that temperature. Milk treated in this manner is said to be pasteurized and is so named after Pasteur.

A hot air sterilizer resembles an ordinary kitchen gas oven but is so constructed that a uniform temperature is easily maintained in the sterilizing chamber. Fig. 6 shows a small hot air sterilizer for use by physicians or in small laboratories. The inside dimensions are about 9½ inches high by 9 inches wide by 6 inches deep. It is constructed of sheet iron and the double doors give ample space for the circulation of the hot air about the chamber. The tubes projecting above the top of the sterilizer are for a thermometer and thermo-regulator. It is heated by means of a Bunsen gas burner. Steam pressure sterilizers or Autoclaves must be constructed to withstand the high pressures necessary to raise steam above the boiling point of water (212° F.). For a water steam temperature of 300 degrees Fahrenheit the pressure required is about 55 lbs. per sq. in. Autoclaves are often made with copper boilers, riveted

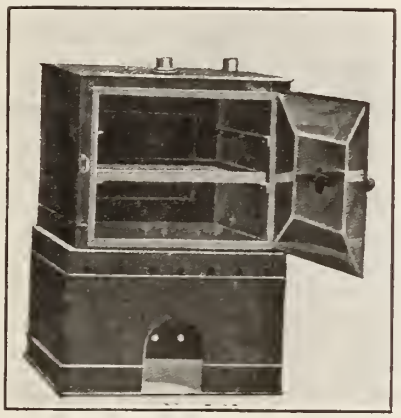


Fig. 6

and brazed, covers and fastenings and inner baskets being of brass. Fig. 7 shows an American high-grade horizontal steam pressure sterilizer which can be heated by steam, gas, electricity or petroleum. It is of the double cylinder type, the steam space completely surrounding the inner chamber to which the steam is admitted by a valve. The walls of the chamber are formed by a seamless drawn brass or copper shell, tinned inside. This sterilizer is provided with a bronze door and frame with copper end. Steam pressure sterilizers can be bought for about $40 and up. The one just described is listed at $350 for a size of 24 inches long by 16 inches in diameter. Hot air sterilizers are of course, much cheaper, the one shown in Fig. 6 being listed at $10.50.

Chemistry.

Chemistry is such a big subject, has so many important branches, any one of which merits a life study, that it seems almost futile to try in a few words to tell anything about the subject. Some knowledge of chemistry will, however, be so helpful in the matters we wish to discuss that we seem justified in an endeavor to present in this article a few necessary elementary facts. With these as a beginning it is hoped that we can go on to more complex phases of chemistry as we need them for any particular purpose. We have already learned something of Bacteriology but need more knowledge of Chemistry before studying the structure and composition of the bacterial cell, how it gets its food and especially what effect bacteria have on the organic matter on which they live. This latter point is very important and sometimes unpleasantly personal when one of us happens to be the organic matter by which the bacteria are being supported.

For the purpoces of sanitation we need to understand the chemistry of the air, the chemistry of the water and its chemical analysis and something of the chemistry of foods. We want to know the chemistry of sewage and of sewage decomposition and the chemistry of the soil. We will find as we proceed how closely associated are bacterial action and chemical change, the former being responsible for the latter in many cases.

All known materials in the atmosphere, on or in the earth are formed from about eighty substances that cannot be broken up into any simpler forms. These substances are therefore called elements. Table 1 contains a list of some of these elements that are most commonly known. The chemical symbol, the approximate atomic weight and the nature of each element is given.

All animal and plant cells contain a combination of carbon, hydrogen, nitrogen, oxygen and a small amount of sulphur. These are the elements, then (shown in capitals in Table I), that are always essential to life. Other elements that may be required or found in varying amounts and in various combinations in living matter are:

Calcium	Phosphorus
Chlorine	Silicon
Iron	Potassium
Magnesium	Sodium

Although present in the soil, only very small traces of aluminum are found in

plants or animals. Iodine is present only in sea-weeds.

There are comparatively few elements occurring free in Nature, but some, such as oxygen and sulphur, are found by themselves—that is uncombined with other elements. Generally two or more elements are combined chemically to form a compound which differs entirely from any of the elements uniting to form it. For example, hydrogen and oxygen are both gases, but when the conditions are favorable, they combine to form water, a liquid under ordinary conditions. It is the task of the chemist to study how these elements are combined and how compounds may be built up and broken down again into simpler compounds or elements. Wherever there is life there is chemical change, new compounds being formed or old ones broken down.

Two or more elements or compounds may be mixed together and yet not form a new substance, the resultant mass being called a mixture, like air, which is largely composed of nitrogen and oxygen uncombined. Brass and granite might be taken as other examples of mixtures.

When iron is heated it becomes red, and if closely noted, it is found that it has increased in size. If allowed to cool, it will be found, however, to be just the same as before heating. When iron rusts a new substance, the rust, oxide of iron, is formed, and this substance is permanently different in color, volume and weight from iron. These are examples, the first of physical and the second of chemical change. A physical change may be defined as a change that takes place unaccompanied by the formation of any new substance. Whenever a change takes place in which one or more new substances are formed, the change is called a chemical one. It has been found that chemical changes are accompanied by physical changes, such as increase or decrease of volume, rise or fall of temperature and sometimes by light or the formation of electricity.

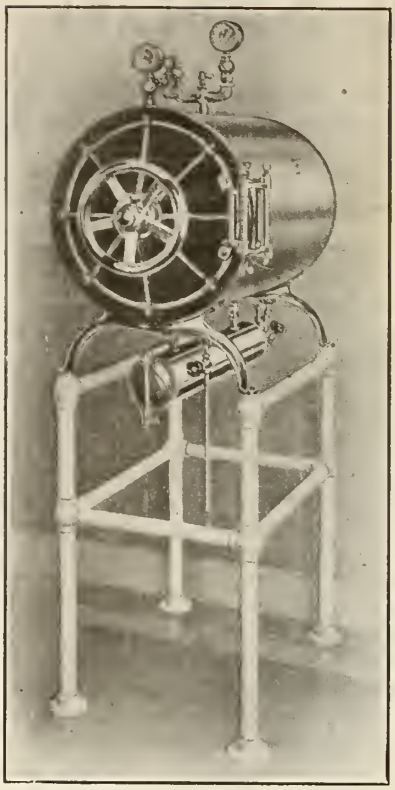


Fig. 7.

Some merely physical changes merit our attention. Water, depending on the temperature may occur as a solid, ice: as a liquid, water; or as a gas, steam. The changes are only physical ones, as no new chemical substance is formed. Other substances have, like water, their respective "freezing" and "boiling" points, which vary greatly for different materials. A substance, whether in the solid or liquid state occupies about the same space, but, as a rule, the change from the liquid state to that of a gas is accompanied by a great increase of volume. By chemically combining solids or liquids so that gases are produced, a very great pressure results if the gases are confined to the space occupied by the original solids or liquids. This is what occurs in the firing of all kinds of explosives.

It has been mentioned that hydrogen and oxygen, under favorable conditions, will unite to form water or, in the form of an equation:

Hydrogen+Oxygen, yield water.

Instead of writing such equations in words, chemists save time by representing each element by the initial letter of its name. To prevent confusion, since more than one element begins with the same letter, sometimes the initial of the Latin word for the element is taken or the initial letter, which is always a capital, is followed by a small letter. These abbreviations are termed chemical symbols and are shown in Table I. It has been proved by experience that chemical compounds, when pure, always contain the same elements in the same proportions by weight. That is to say, that in water, for example, there is always the same proportion by weight of hydrogen and the same proportion by weight of oxygen. The relative weights of the different elements are termed their atomic weights. These are also shown in Table I.

A chemical compound is represented by means of a formula made up of the symbols of the elements concerned. Thus

(Continued on page 19.)

TABLE I.

Some Chemical Elements.

Name.	Symbol.	Approx. Atomic Wt.	Nature.
ALUMINIUM	Al	27	Metal
ARSENIC	As	75	Metalloid or Non-Metal
BISMUTH	Bi	208	Metal
CADMIUM	Cd	112	Metal
CALCIUM	Ca	40	Metal
CARBON	C	12	Metalloid
CHLORINE	Cl	35.5	Gas
COPPER	Cu	63.5	Metal
GOLD	Au	197	Metal
HYDROGEN	H	1	Lightest Gas
IODINE	I	127	Metalloid
IRON	Fe	56	Metal
LEAD	Pb	207	Metal
MAGNESIUM	Mg	24	Metal
MERCURY	Hg	200	Metal
NICKEL	Ni	59	Metal
NITROGEN	N	14	Gas
OXYGEN	O	16	Gas
PHOSPHORUS	P	31	Metalloid
PLATINUM	Pt	195	Metal
POTASSIUM	K	39	Metal
SILICON	Si	28	Metal
SILVER	Ag	108	Metal
SODIUM	Na	23	Metal
SULPHUR	S	32	Metalloid
TIN	Sn	119	Metal
ZINC	Zn	65	Metal

Analysis of Canadian Sanitary By-laws

This Series of Comments Relates to the Sanitary Engineering By-Law Number 449 of the Town of Oakville, Ontario—In Many Respects This By-Law is Far in Advance of Some By-Laws Now in Force in Larger Cities.

LICENSES.

Clause (38).—No person shall undertake or carry on the work of constructing any house sewer connection or any line of sewer pipe connected with or to be connected with the public sanitary sewers unless such person has first obtained a license from the council authorizing him to carry on the work of sewer construction; and no person shall undertake to carry on the work of plumbing or of constructing or installing any part of the plumbing or sanitary fixtures or appliances in, or in connection with any building or place unless such person has first obtained a license from the council authorizing him to carry on the business of a plumber and unless such license is in force.

APPLICATION FOR LICENSE.

Clause (39).—Any person desiring a license to carry on the work of sewer construction or to carry on the business of a plumber shall file with the clerk an application for such license accompanied wiht the fee hereinafter specialized. Upon the receipt of such application the Clerk shall deliver the same to the engineer who shall return the application to the Clerk with a report to the council as to the qualification of the applicant to carry on the work in question, and his familiarity with the terms of this by-law. Such application shall thereupon be brought by the Clerk before the council at its next ensuing meeting. The license shall be in such form as may be prescribed by the council and may be granted by resolution.

FEES.

Clause (40).—The fee for a license to carry on the work of sewer construction shall be one dollar and the fee for a license to carry on the business of a plumber shall be five dollars.

DURATION OF LICENSE

Clause (41).—Every license hereunder shall remain in force for one year, but may be cancelled by the council at any time without notice, or may be suspended at any time by the engineer, who shall, however, forthwith report such suspension to the council. Unless cancelled or suspended any license may be renewed by the Clerk from year to year without a new application upon payment of the fee above specified.

DISPOSITION OF FEES.

Clause (42).—All fees received by the Clerk hereunder shall be paid over to the treasurer of the corporation.

PENALTIES.

Clause (43).—Any person convicted of a breach of any of the provisions of this by-law shall forfeit and pay at the discretion of the convicting magistrate a penalty not exceeding the sum of fifty dollars for each offence, exclusive of costs, and in default of payment of such penalty and costs forthwith, the said penalty and costs or costs only may be levied by distress and sale of goods and chattels of the offender, and in case of there being no distress found, out of which such penalty can be levied, the convicting magistrate may commit the offender to the common goal of the County of Halton with or without hard labor for any period not exceeding thirty days, unless the said penalty and costs be sooner paid.

Clause (44).—This by-lay shall come into force immediately upon the passing thereof.

Read a third time and finally passed the third day of February, 1913.

J. T. MADDEN, Mayor.
WM. E. M. CRAWLEY, Clerk.

NOTICE TO READERS.

We have quite a number of readers who send in questions to be answered but fail to give us their address. We would like to receive addresses as a guarantee of good faith, also to enable us to answer their question privately. For instance, we had several questions which showed the answer was urgent, because of its very nature, and in such a case the questioner has had to wait in many cases over two weeks and more, and often a question is such that it requires more particulars. Therefore we respectfully ask our readers to give us their full address, which is not necessarily for publication.—Editor.

PRACTICAL SANITARY SCIENCE.

(Continued from page 18.)

HCl, hydrochloric or muriatic acid, indicates a compound made up of one part hydrogen and one part chlorine. The relative weight of hydrogen to chlorine is according to our table, 1 to 35.5 so that:

1×1 or 1 part by weight of Hydrogen and 1×35.5 or 35.5 parts by weight of Chlorine, makes a total of 36.5 parts by weight of HCl.

The chemical formula for water is H_2O and shows us that 2 parts by weight of hydrogen and 16 parts by weight of oxygen form 18 parts by weight of water and the equation when hydrogen and oxygen unite to form water is written:

$2H+O=H_2O$

The equation, $C+2O=CO_2$, means that one part of carbon (atomic weight 12), combines with 2 parts of oxygen to form carbon dioxide or carbonic acid gas. In other words, 12 parts by weight of carbon yield $12+(2\times16)$ or 44 parts of carbon dioxide. This is what takes place when coal (mostly carbon),is burned in a furnace when there is sufficient air to supply all the oxygen needed. If the supply of oxygen is insufficient we get the following reaction of incomplete combustion:

$C+O=CO$, or carbon monoxide, a very unpleasant and poisonous gas, which can be avoided by well constructed and properly attended furnaces.

(Continued in next issue.)

HE QUALIFIED.

"Tommy Atkins" pleaded exemption from church parade on the ground that he was an agnostic. The sergeant-major assumed an expression of innocent interest.

"Don't you believe in the Ten Commandments?" he mildly asked the bold free-thinker.

"Not one, sir," was the reply.

"What, not the rule about keeping the Sabbath?"

"No, sir."

"Ah, well, you're the very man I've been looking for to scrub out the canteen."—Tit-Tits.

The Sanitary Engineer

Plumber and Steamfitter of Canada

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TORONTO, MAY 1, 1915

Proposed New Provincial Plumbing Code for Ontario

ONE of the main features discussed at the recent convention of the Ontario Society of Domestic, Sanitary and Heating Engineers, was the one dealing with the proposed new provincial plumbing by-law. In our next issue we will take this proposed by-law up, and comment upon it clause by clause.

The main argument in favor of such a by-law is that of complete protection for the public. There are also reasons why the sanitary engineer should endorse such a measure. As is well known there are to-day quite a number of men engaged in the business, who are not interested in it for more than the mere dollars and cents.

Now such should not be the case. Sanitary and heating engineering is too important a profession to be peddled around in any way, and unless a person is really interested in it for more than the mere money he can get out of it, he has not the health of the people at heart.

It seems a shame to see how unmerciful a person can be when he installs any kind of fixtures in any old way for the mere money there is in it.

It is quite a different matter when dealing with certain merchantable commodities which do not directly affect the people's health.

Therefore, we feel that there should be some provision made to prevent persons of an irresponsible nature from installing inferior goods in any slip-shod manner.

A provincial plumbing by-law would be a boon to every town or village, and would control the plumbing installations in every rural district, thus ensuring good work to every householder.

There is no reason in the world why the rural resident should not have just as good sanitary installations in his home as are found in the home of the city dweller.

Workmen's Compensation Act

IN addressing those present at the recent convention held in Toronto, G. A. Kingston, one of the Commissioners acting upon the Workman's Compensation Board, gave out some very interesting information relative to the Ontario Workman's Compensation Act, as it applied to sanitary and heating engineers. He certainly made things look very fair to all.

The Sanitary Engineer interviewed another member of the board some time ago and was thoroughly convinced that the Act was about as equitable an act as could possibly have been drawn up, and Mr. Kingston showed too, that what the board really needed was a little co-operation.

Co-operation from every member of the craft would lighten the burden for all. Every sanitary and heating engineer should see to it that every precaution be taken to prevent accidents, however trifling, and thus enable the board to lower the assessments from time to time.

The appointment of a practical man as inspector would, no doubt, prove to be a boon to every class. Such a man would have to be endowed with the spirit of the Act. He would also be in a position to assist or advise as to how to reduce the number of accidents to a minimum. This would reduce the assessment. Mr. Kingston's address will appear in May 15th issue and will no doubt prove very interesting.

The National Convention

FROM what we can learn the coming Canadian National Convention which is to be held in St. John's, N.B., will be one of the most interesting ever held in the history of the trade. It is not so long ago that the craft began to take active interest in the association, and since then several local societies have been formed, and good work is being done.

We believe that the time is not far distant when every board of health throughout the Dominion will have a member of the trade as one of its active workers. There are quite a number already serving in that capacity in the Maritime provinces.

This is only one of the many things which have been brought about by the various association members.

To-day the public are beginning to pay more attention to sanitary engineers and their accomplishments than ever before, and it is only by associating one with another that anything of note can be accomplished.

It is not possible for any man to make a real success in life unless he has a life partner to share his trials, troubles, and his joys. His success is only shallow. He has not fulfilled all the laws of nature,

and is therefore not a success. It is the same with craftsmen who do not join their association, they will never accomplish anything worth while.

The man commencing on business should first of all find out all about the society interested in his line. Next he should qualify and join it. He should, as it were, apply for a partnership, become a member, and exchange his views with those of his fellow craftsmen. By so doing, he will become conversant with every matter of interest, he will become more liberal in his views, and he will join hands with those who are assisting in the great progressive strides which sanitary engineering has made.

Every man who is not a member of his local, provincial or Dominion association is enjoying many of the privileges which have and are being striven for by those who are members. To prove our argument, let every man engaged in the trade ask himself, "Have I done one thing to improve conditions relating to my calling? Have I subscribed in any way to any move which has improved sanitation?"

In conclusion let us hope to see a goodly number of members of the craft in evidence at the coming convention.

When Money Talks

MONEY talks of all that is most interesting in the world, of human endeavor, human perseverance, human success. It speaks through the lips of those who have known how things should be done and have done the things they knew how to do. But money in a pocketbook is dumb. It is inactive, and not only so, but when it is allowed to accumulate, as is the case to-day, it is the cause of business depression. Money is talking in Britain to-day, it is able to pay higher wages to the worker. Money is paying for the war out of natural resources, and when the war is over there will not be one cent less in circulation but rather more, if anything. Yet in Canada money is being hoarded, businesses are closing down, men are working short time, and some are working for reduced salaries, in spite of the fact that cost of living is on the increase. Therefore if money is circulated more freely, we shall hear its voice, talking through the factory hum. The tailor, the grocer, the shoe makers and dry goods merchants all, will hear the conversation, if, we all do our part, spend, and speculate and in that way let money talk to all, rather than to the favored few. This can be done, too, by getting out after new business. The very act of getting after new business costs money, and fills a dual purpose, by increasing circulation and distributing money. It is strange yet none the less true that a $10 bill circulated through the hands of 10 persons, 10 times a year actually cancels $1,000 worth of debts. Thus it can be plainly seen that any means whatever which will tend to increase the activity of wealth will be a boon to the people at large.

The Order of the Bath.

THE Order of the Bath would have been dignified if it had been conferred on the various inventors of sanitary plumbing, says *Modern Sanitation*. Many persons who have made a great deal of noise in the world have done less good than those who lined the bath with porcelain, those who conceived the idea of knocking away the woodwork from the plumbing, those who first put in tiled walls and floors, those who cheapened and popularized the stationary bath and made it comfortable by laying on hot water, those who helped in various ways to make soap and water attractive.

Comic literature is full of jokes about the plumber. We do not undertake to defend all his delays and all his bills. But many a coat-of-arms commemorates services far less honorable and far less useful than those of the plumber.

Fashionable novels deride the wealthy soap-boiler and his efforts to get into good society, the society that knows almost as well as a butler that claret ought not to be iced. But soap has done a great deal more for civilization than the finest vintages.

It has been said that modern plumbing has done more for humanity than the railway. It would be difficult to strike the balance. But it is certain that civilization owes an enormous debt to the inventors and improvers of the railway, of modern farm machinery, of modern business methods, of modern devices for increasing the comfort of the home and lessening the labor of the housewife. The people who talk of this as "gross materialism" are talking nonsense.

Trade Paper Stands High

THE trade paper has, of recent years, been rapidly gaining the recognition it rightfully deserves. Anyone who studies business conditions to-day realizes that the trade paper specializing on particular lines of trade is fulfilling a mission that could not be dispensed with.

W. J. Egan, Canadian Trade Commissioner in Cape Town, South Africa, in his last report to the Government, gives his views of the trade paper. These views must be considered unprejudiced and as representing his personal convictions. The report says:—

"The files in connection with the Canadian daily and trade papers have been reorganized. The Canadian newspaper list is confined to one daily business paper and the *trade paper* file has been increased from six publications to seventeen.

"The trade papers are much appreciated and there a number of regular callers who read them; this number is growing for two reasons; when making a local call on any particular subject, the Canadian trade paper of the subject in hand is taken, always reminding the party interested that trade papers of all kinds are on file, and in correspondence up-country firms are reminded of the Canadian trade papers on file in Cape Town." (Note the big increase in the list of trade papers.)

Read in connection with the item in a recent issue as to what the Commercial Attache in London, Eng., of the United States government thinks of the trade paper, the evidence that its importance and value are constantly and steadily growing is ample. The trade newspaper is undoubtedly performing a most useful service to business interests.

New Sanitary and Heating Goods

NEW CELLAR DRAINER.

Another new device is being put on the market by The James Morrison Brass Mfg. Co., Ltd., Toronto, in the form of a cellar drainer. The device embodies an automatic Supply Valve controlled by a heavy Copper Float and a Patented Water Lift, a powerful device for lifting Liquids by Water pressure.

The operation of Drainer is extremely simple, being actuated by the raising or lowering of Float as the Water level changes in the Pit.

These outfits have been in continuous successful service for upwards of two years without requiring the slightest attention.

The apparatus is constructed with Ground Union Joints at all connections, thus dispensing with Pipe Unions and

New Cellar Drainer.

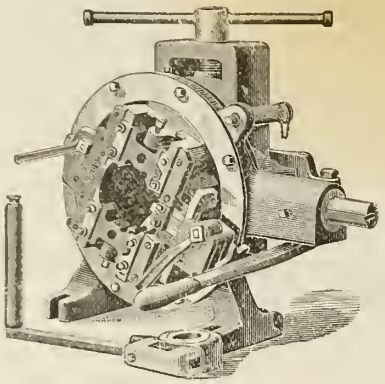
Nipples and making a perfect and convenient installation, one that can be quickly disconnected when the occasion arises.

All mechanical parts are exposed and readily accessible, being free from contact with the liquid being drained. This prevents any detrimental effect from slime or other foreign substance to which immersed apparatus is at times subjected.

Further particulars as to the various sizes and prices may be had, upon application from the above named company, who are the sole manufacturers.

NEW PIPE THREADING MACHINE.

No man can be expected to do the same amount or even the same quality of work with poor tools as with good tools, and in the sanitary and heating trade, good tools play a very important part. The Armstrong Manufacturing Company, Bridgeport, Conn., have introduced another pipe threading machine



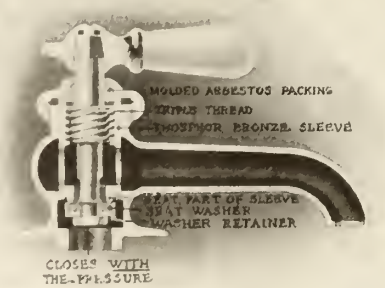
New Pipe Threading Machine.

to their list of machines and tools. This machine has a range of from 1 inch to 4 inches, both right and left. It can be fitted to a stand or bench. All parts we are told are interchangeable. It is also possible to cut pipe as well as thread it.

QUATURN FAUCETS TO BE MADE IN CANADA.

The trade will no doubt be interested to learn that the Wallaceburg Brass & Iron Mfg. Co., of Wallaceburg, Ont., have just entered into a contract with the Chicago Faucet Co., of Chicago, Ill., whereby they will be licensed to make the Quaturn Faucet line in Canada.

The Quaturn Faucet has been on the market in the United States for some time. It is Fuller in action, though it does not contain the soft Fuller ball. Instead of this, the Quaturn has a hard



New Quaturn Basin Cock.

composition seat washer, entirely encased in brass, which cannot swell up, spread or crumble. The Faucet has a removable seat made of phosphor bronze, and all the working parts are machined to size, and are interchangeable. Another feature of the Quaturn is that it closes with the pressure.

A careful study of the cut above will give a general idea of the working parts of the "Quaturn."

Further particulars may be obtained from the Wallaceburg Brass & Iron Mfg. Co., Ltd., Wallaceburg.

AN IMPROVED DIE STOCK.

No part in the work of installing pipe lines is so important as the proper threading and reaming of piping, and to ensure a perfectly straight thread is a feat very seldom accomplished where bushings are used.

One of the greatest improvements in pipe threading tools is the internal guide lately added to the Little Giant Trio line now being manufactured by the Wells Bros. Co. of Canada, Limited, Galt, Ont.

This guide is made in sizes to fit the inside of the pipe to be threaded. The reamer point entering the pipe removes all burrs and compels the die to start straight. Thus the guide serves a double purpose — guiding and burring at the same time —saving the cost of the burring reamer besides time and cost of one operation.

Even when pipe is cut on an angle no difficulties are presented as the guide will not permit the die to tip and make a crooked start. As the reaming of the pipe is always desirable and in some places obligatory, the distinct advantage of pipe threading tools fitted with this form of guide will at once be apparent. The reamer guide working inside the pipe permits threading on a much shorter projection than was possible with the old style of bushing guide.

Those of our readers who would like to know more of these time-saving and efficient die stocks should write to the above address for further particulars.

Group of Members and Delegates at the Recent Ontario Convention.

Ontario Society Annual Convention

The Above Society Held Their Fourth Annual Convention, April 22, 23 and 24 — A Good Number Were in Attendance Which, on the Whole, Was Fairly Representative.

THE convention proper of this society was preceded by a meeting of the executive committee held in the office of the Toronto Commitee of Domestic, Sanitary and Heating Engineers, Room 507 Canadian Foresters Building, on Thursday afternoon. The following members of the executive were present:

President Harry Hicks, Vice-President, E. H. Russell, Treasurer, Geo. Clapperton, Secretary, G. F. Frankland; Auditors, Geo. Ross, Tom Maxwell. Chairman of Committees: R. G. Sturgeon, J. I. Blyth, Geo. E. B. Grinyer, E. Lewis Le Grow, S. J. Cherry, A. H. Currie, Frank Sainsbury.

The meeting was called to order by President Harry Hicks of Toronto, and the first item on the list for consideration was the minutes of the directors' meeting held on April 19.

Toronto, April 19th, 1915.

Directors' Meeting of the Ontario Society of Domestic Sanitary Heating Engineers, held in the Secretary's office at 4 p.m.

Messrs. Hicks, Clapperton, Mansell, LeGrow, Maxwell, and Secretary Frankland being present.

The Secretary reported that the draft regulations for Provincial Plumbing Ordinance had been attended to and were now complete as per directors' instructions of last meeting.

The Secretary reported interview with Dr. McCullough regarding our proposed amendment to the Public Health Act. He stated that he was sorry that our amendment had not become law at the session of the Legislature just over, claiming that it had among other amendments to the Public Health Act been approved of by the Board, and had been signed and received the sanction of the Minister of the Department, but that in some way it had been mislaid and in the rush at the end of the session it had been forgotten until too late.

Dr. McCullough claimed the best thing to do now was to mark time until next session. After his promising us that the amendment should positively go through he would do everything possible to assure its passing next session.

The Secretary reported interview with Geo. A. Kingston, Esq., Commissioner of the Workmen's Compensation Board, who claimed that our society would be acceptable to the Board as the representative of those included in class 36, connected with our line of business.

On motion of J. R. Maxwell, seconded by E. LeGrow, the directors recommend that the Society take advantage of Clause 101 of the Workmen's Compensation Act, adopt necessary by-laws, appoint an inspector and apply to the Wokmen's Compensation Board for authority to act on behalf of those included in our group of class 36 of the Workmen's Compensation Act of Ontario as provided for in Clause 101 of the Act.

Resolved, that the communications as received be attended to and filed by the Secretary.

And that, as requested by Jas. R. Haslett of London, Mr. Kingston of the Workmen's Compensation Act be secured to address the Annual Meeting on Friday, April 23rd, at 2.30 p.m. Upon motion of F. R. Maxwell, seconded by Geo. Clapperton, that Secretary notify Mr. Haslett of same.

Secretary reported the receipt of ten dollars from E. H. Barnes and fifteen dollars from J. P. Band & Co., Ottawa, for dues; also the receipt of seven dollars and fifty cents from The Dominion Radiator Company for their advertisement in the March Bulletin; also the receipt of certificate and constitution from J. R. McLennan, Ottawa, and certificate from J. R. Wainwright of Sudbury. These gentlemen having complied with

the constitution and by-laws of the Society their resignations were accepted.

Resolved that Secretary request Mr. Brenton of Peterborough to attend the annual meeting and that he also invite Mr. Elliott of Kingston to attend.

The directors adjourned at 6 p.m. until Thursday, April 22nd, at 2 p.m., when the executive committee will meet.

On the motion of Geo. Clapperton, seconded by R. G. Sturgeon, the above minutes were accepted.

The President's report, which follows, was held over until the regular meeting of the convention on Friday morning.

President's Report.

Gentlemen:—

It is with a great deal of pleasure that I submit this report. First a pleasure because my term of office has expired, and I shall be relieved from the duties which took a considerable amount of my time, which I could not afford. Second, because it will give the Society a chance to elect a new man to the chair who will be able to do more for the Society than I have done, as it needs a very strong man at the head of a society of this kind, one to whom the whole trade has to look up for his personality, business success and technical training.

We have not been as successful this year as we expected, but the disturbed condition of trade and commerce, resultant from the war, is no doubt partly to blame. I assure you that I did not know that the Kaiser was going to spring this war on us or I would not have taken the chair this year, as I should have been with the Minister of Militia getting us ready for the front.

However, we have been fairly busy. First the convention at Ottawa, which our secretary and myself attended and succeeded in having the Canadian society per capita subscription fixed at $1.00 per member, but the question of the Canadian society being an executive body will have to be fought out later as it was impossible to get that through last year. If possible I would suggest that we send at least one representative to St. John's, N.B., to press our views, and I think it will carry this year.

Our secretary will report further on the convention. I am sorry I cannot report an increased membership or a good financial position, but we have found out who are the good ones, and who appreciate the work done by your officers. The treasurer's report taken with the secretary's report will show you how we stand in these matters.

In my report last year I made a recommendation for bulk buying for cash, but your directors did not think very favorably of this. There was nothing done along that line and I still hold that it is practical and would be a boon to the majority of our members.

Your officers spent considerable time in an endeavor to get an amendment to the Provincial Health Act to regulate plumbing throughout Ontario, and we have a promise of Provincial Secretary Hanna and Dr. McCullough that they are in accord with same and will see that it is embodied in the Health Act, and if it is followed up the desired regulations will be forthcoming.

In connection with the Workmen's Compensation Act we will have to be alert and keep [illegible] in our class, and be ready to have adjustments made at the end of the year if any part of the Act is affecting us discriminately.

The manufacturers and jobbers we have always with us as a burden to the trade, but our members should report any [illegible] on the part of the above, and if some trade taken up as a Society matter we do not it would have more weight if they were asked by our Secretary to stop their unfair practices.

In connection with heating specifications, I would like to see the Society have a standard heating specification adopted to be used by our members and to be independent of the manufacturers.

On getting the treasurer's report, you will see that we intend to retain the per capita assessment, but if the Society is to continue its good work, some provision will have to be made to pay the secretary some remuneration, as he will have to give a considerable portion of his time to this work, if you cannot afford to keep him on full time and pay.

Wishing the Society every success and feeling sure that with the dead branches cut

H. HICKS, Toronto.

off the live ones will bear good fruit in the coming year, and that your directors will not have to devote most of their time to devising means of collecting dues, but will be able to devote their time to other matters for which the Society was formed.

Yours very truly,
H. G. HICKS.

The Vice-President's report was received on motion of Geo. Ross, seconded by S. J. Cherry.

Vice-President's Report.

Gentlemen:—

The annual convention being a time for officers to make a final report of their stewardship, it has occurred to me, that it might be well to trace the actual advance that has been made since last convention. The Work-

L. LEGROW, Toronto.

men's Compensation Act loomed large then, and has been the foremost topic since. The recommendation made then, time has proved to be correct, and in order to be fair to your clients and also to yourselves, it is absolutely essential that all letterheads, estimates and bills should carry the legend: "The assessment has been paid for the current year."

The introduction of clause 98, page 31, in the act, which makes the owner finally liable for unpaid assessment, and which was amended at the last session, making the owner also responsible for the compensation, shows that we acted with considerable foresight. The question of general bulk contracting has also been to the fore, especially in Government work. At the national convention at Ottawa in June, we presented a petition to Hon. Mr. Rogers, Minister of Public Works, requesting that the sanitary and heating engineering and lighting be eliminated from the general contract and let separately. Mr. Rogers promised us the usual careful consideration. The matter of the trade discount of 15 per cent., discussed at last convention, I am pleased to say, now reads 20 per cent.

The plumbing regulations under the provincial board of health have been carefully considered and revised to meet conditions of various localities, and when finally made law will be of great benefit to the province. The heating (H.W.) specification—the London Society has had a number printed. Samples of same may be had from Secretary Frankland.

In conclusion I would like to say a word in praise of the directors, the Toronto members especially, who give such a vast amount of time in the interest of the craft, and I congratulate them on having secured an examining committee for the city of Toronto.

All of which is respectfully submitted.

(Signed) E. H. RUSSELL.

Secretary G. F. Frankland then read the Treasurer's report:

Treasurer's Report.

Gentlemen:

In conjunction with the financial report of the Ontario Society for 1914, I wish to bring the following matters to your notice. While the total receipts were $1232.27, the actual receipts for the year were only $1135.00, the difference being the balance brought forward from the previous year.

While the total disbursements were $1066.73 and there remains a balance in the bank of $165.44 at the end of our fiscal year, it is nevertheless a fact that the society is in debt for 1914. And the amount of the accounts not paid that belonged to 1914, is $509.60, made up as follows:

Secretary's salary from Sept. 26, 1914, to Jan. 30, 1915	$360.00
Per capita subscription to the Canadian Society for 1914	130.00
Postage, stationery, etc., up to Jan. 30, 1915	19.60
Total as above	509.60
Deducting the balance in the bank of..	165.44
Leaving balance on the debit side of ..	344.16

This condition of affairs is to be deplored, and last year when the revenue of the Society was estimated, it was never thought that we would have to face a deficit this year, as there was sufficient revenue from members' dues to more than take care of all possible expenditure that would arise during 1914. To show that this assertion is correct I revert to the financial report of 1913, which showed a balance of unpaid dues and assessments of $827.00. This added to our revenue for 1914 from the members' dues which totaled according to the 1914 rate for dues on our membership of 182 to $1332.00, made a total as follows:

Balance unpaid dues 1913	827.00
Estimated dues for 1914	1332.00
	2159.00

As you will notice, this would have given us very nearly twice as much as what our expenditure actually was if it had all been paid. But it was not all paid. Whether trade conditions, the war or whatever was the cause is ever found out or not, I do know that we have not received sufficient to liquidate the affairs of the Society for 1914 just because certain of our members did not live up to their obligations to the Society.

Estimated Expenses up to April 24, 1915.

Amount of salary unpaid up to Jan. 30, 1915	$200.00
Amount of salary unpaid up to Apr. 24, 1915	240.00

Amount required for 1914 per capita, sub. Can. Soc.	130.00
Amount required for hall rent, Apr. 23, 1915	10.00
Amount estimated for postage, etc., up to Apr. 24, 1915	20.00
Amount estimated for annual meeting —steuographer, caretaker, etc.	25.00
Total	$625.00
Estiuated expenses	$625.00
Cash iu bank, April 1st	178.84
Leaving debit balance	$446.16

Estimated Expenditure, 1915.

The following is an estimate of expenses for the Outario Society of Domestic, Sanitary and Heating Engineers, from February 1st, 1915, to January 31st, 1916 (not iucludiug secretary's salary).

Stenographer and caretaker at annual meeting, 1915	$ 25.00
Hall rent for annual meeting, 1915	10 00
Annual report, 1915	44.00
Per capita to the Canadiau Society, 1915	130.00
Printing aud stationery	75.00
Postage	100.00
Telephone calls aud exchange charges..	10.00
Goverumeut fee	1.00
Solicitor's fees	10.00
Total	$405.00

Assured Revenue, 1915.

Those on sheet A. are members who will most likely pay their dues for 1915, making a total revenue of eight hundred and forty-five dollars ($845.00) as follows:

Sixty-four members at $10.00 each	$640.00
One member at $15.00	15.00
Toronto committee fifty-five members..	190.00
	$845.00
Less estimated expenses as above	405.00
Leaves balance of	$440.00

GEO. CLAPPERTON,
Treasurer.

On the suggestion of R. G. Sturgeon, seconded by G. E. B. Grinyer, this report was passed on to a committee for further investigation, President Hicks pointing out that a large uumber of dues were considerably in arrears, and it was necessary to decide what action should be taken to bring recalcitrant members to time, as the society had already done almost everything but sue for payment.

Messrs. S. J. Cherry, E. H. Russell and George Ross were appointed a committee to discuss the question with Secretary Frankland.

The secretary's report was received on motiou of R. G. Sturgeon, seconded by Geo. Clapperton.

Secretary's Report.

Gentlemen:

As your secretary for the year, I wish to report as follows: I will not try to excuse myself in any way for the present condition of the affairs of the society, as I do not consider that my shortcomings are responsible for the backwardness of the society's advance during 1914. I wish to recall to your mind the condition of the society's membership at the last annual meetiug, when it was reported that the membership on January 31, 1914, totaled 183. This number was considered as showing good progress up to that time, and it was stated that with the services of a permanent secretary the membership should be doubled. I only need say that your membership at January 31, 1915, was 180, being three less than a year ago. Mighty bad showing, say you. I agree with you and I would like to say more than that about it, but what is the use? Messrs. Holloway & Son, Ottawa, and W. J. Boyce, Wingham, resigned shortly before the end of the year, taking advantage of a reduced offer for their indebtedness to the society made by the directors at that time to realize some cash on the outstanding dues, while Jas. Williams, of St. Thomas, who has been considered a member all the time was reported to the directors as having disposed of his business in St. Thomas some time ago aud left for parts unknown. These account for the reduction of three in the membership, as shown above. Where is the expected increase that we were to have, say you. In answer I must say that owing to the lack of receiving sufficient funds by the society it was impossible for me to do any traveling, therefore I am not able to show any additional members to the society. When in Ottawa, attending the Canadian Society Convention, I approached the officers of the Ottawa committee regarding their local affairs and they expressed the opinion that it would be no use at that time to call the trade together on account of certain differences of opiuion which existed between various members

STATEMENT OF FINANCES—1914.

Ending January 31st, 1915.

RECEIPTS.

1914.			
Feb. 1	By Bank balance		$ 97.17
Mar. 9	Dues received		160.00
Mar. 16	"	"	40.00
Apl. 2	"	"	185.00
Apl. 2	"	"	55.00
May 7	"	"	65.00
May 9	"	"	10.00
May 16	"	"	10.00
May 20	"	"	10.00
June 2	"	"	80.00
June 30	"	"	100.00
July 14	"	"	15.00
Nov. 7	"	"	50.00
Dec. 9	"	"	265.00
Dec. 30	"	"	20.00
Dec. 31	"	"	50.00
1915.			
Jan. 12	"	"	10.00
Jan. 30	"	"	10.00
Total Receipts			$1,232.17

GEO. CLAPPERTON,
Treasurer.

DISBURSEMENTS

1914.		
Feb. 6	To secretary's salary, January	$ 40.00
" 6	Postage and Stationery	8.00
" 10	Alexander Eng. Co., Certificates	5.00
Mar. 10	Fred Smyth, printing	5.00
" 10	Fred Smyth. Printing	3.25
" 10	Sutherland Press, printing	7.25
" 10	Secretary's salary, February	40.00
" 10	Trav. expenses, postage, stationery	89.35
" 28	Annual Government fee	1.00
Apl. 2	Can. Foresters' Hall, Ltd., rent	15.00
" 2	Fred Smyth, printing.	9.75
" 2	I. Collins, stenographer, reporting annual meeting	15.00
" 2	Secretary's salary, March	40.00
" 2	Expeuses annual meeting	13.25
" 16	Office Spec. Co., Desk and chair	41.00
" 16	Sec'y's salary, to Apl. 11th	40.00
" 16	Postage aud stationery	9.00
May 5	Fred Smyth, printing	4.25
" 5	Smith, Rae & Greer, solicitors' advice	5.00
" 5	Secretary's salary, to May 2nd	60.00
" 5	Postage aud stationery	12.50
" 14	MacLean Publishing Co., annual reports	44.33
" 16	Secretary's salary, to May 16th	40.00
June 1	Canadiau Foresters, hall reut	5.00
" 1	Sutherlaud Print, printing	8.50
" 1	Fred Smyth, printing	4.50
" 1	Secretary's salary to May 30th	40.00
" 1	Postage aud stationery	12.00
" 20	Secretary's salary, to June 20th	60.00
" 20	G. F. Frankland, Degate Ottawa convention	40.00
" 30	Secretary's salary, to July 4th	40.00
July 2	H. G. Hicks, delegate Ottawa convention	40.00
Aug. 12	Sutherland Print, printing	15.00
Dec. 7	Fred Smyth, printing	15.00
" 7	Secretary's salary, to Sept. 26th	240.00
" 7	Postage aud stationery	9.70
Total Disbursements		$1,066.73
Balance in Bank		165.44
		$1,232.17

G. F. FRANKLAND,
Secretary.

LIABILITIES.

Per Capita to Canadiau Society	$130.00	
Secretary's salary	360.00	
Postage and stationery..	19.60	
		$ 509.60
Less Bank Balance		165.44
Deficit		$ 344.16

ASSETS.

Dues Outstanding and Past Due	$1,256.00
Office furniture	30.00
	$1,286.00

which made it impossible for them all to agree. They were, however, to get together shortly after the convention and straighten out their differences and lay out a plan for future operations when they would call upon me to go back and assist them as far as I was able. Never a word have I heard yet about going back to Ottawa, while from reports received they are in worse condition to-day than they were in June last. When you go into the Treasurer's Report you will think so too. Out of 19 in their committee only nine have paid their dues, two of these resigning on doing so and one returning his certificate, etc., claiming he never belonged to the Society.

The Twin Cities committee have had troubles of their own, from all reports. I offered to go up there and do what I could to straighten them out. But as trade conditions have been so bad with them, they could not guarantee my expenses, let alone pay their dues, while at the same time different ones up there expressed the wish that something be done to help them along. Four out of their seventeen members met drafts when presented, the balance giving one reason or another for non-acceptance. Their biggest trouble seems to be dissension among themselves. The resignations of three of their members are before the directors for action at the present time, awaiting further particulars, which have been promised, regarding their local affairs. These three members are combining interests and intend to carry on business under one firm in the future. So that we really retain them all, though they will only count as one. This leaves us a balance of fifteen members in the Twin Cities committee.

The Toronto committee has had its ups and downs also, several resignations have taken place, but new members were added to the committee, so that their number stands as before at fifty-five. Fifty-three of our members outside of the committees mentioned met their obligations to the society, while among the remaining thirty-eight, to get them to pay their dues, there has been expended enough time and energy by the directors, to say nothing of the money it has cost to more than take care of the up-keep of the present Canadian Navy. Letters were forwarded repeatedly, drafts drawn on them, reduction made in accounts, as special inducements for them to pay up and eventually a solicitor's letter, all to no avail. In fact, the majority of them did not even reply, let alone pay their dues. Those who did reply claimed no responsibility and in several cases desired to withdraw from the society. In fact, since February 1, 1915, there have been the following requests for withdrawal: Eccleston & Bates, Bracebridge; J. R. Walnwright, Sudbury; Goodram Bros., David Robinson and Jas. Steward & Son, of Hamilton, who have all complied with the constitution and by-laws in this matter. While a half dozen more have signified their intention of dropping out, but as yet have not done so according to the constitution. I have only mentioned these matters to show the impossibility of accomplishing what was expected without funds. I might say right here that the directors have individually advanced me money in lieu of my salary, which remains unpaid because there were not sufficient funds on hand to meet it. This money is still owing to these gentlemen who have not only given their time in behalf of the affairs of the society, but have had to finance it as well. Then again, let me tell you that I visited Kingston and Perth, both at my own expense,

MAYOR MAHONEY, Guelph.

and while no perceptible good came of these visits, I do think it paved the way for future results. Also I visited Hamilton on some five or six occasions and managed to enthuse those in the trade there to such an extent that I got over thirty of them to attend several meetings and to decide to form a local association, after which they decided that for the time being they would run their own affairs and maybe at some later date would consider joining the Ontario Society. But there is this much to be said of Hamilton, they paid my expenses in connection with my visits there. During the year I also visited Brantford, Dundas and Brockville, at my own expense, while on two occasions I visited St. Catharines, when the society paid the expenses. I secured a mileage book on the C.P.R., expecting to have considerable travelling to do, but as my funds gave out I was unable to continue and I have about fifteen dollars' worth of mileage on hand that is good up till July 14, 1915. The correspondence for the year was extremely large, and showed a considerable increase over previous years, as my files will show, thanks being due certain of the members for their prompt manner of answering my communication, though there is considerable room for improvement along this line yet.

I compiled a minimum sanitary plumbing by-law at the request of L. Gies, of Dundas, suitable for adoption in my mind for a town of its size, at the same time allowing for future growth. During the year there was also a set of regulations drafted which will be submitted for your approval at this meeting. These were in connection with our proposed provincial plumbing regulations and were compiled for the consideration of the Provincial Health Board. Regarding our Society's aim to serve provincial regulations enacted for the installation of sanitary plumbing throughout the province, I believed two months ago that our desires in this matter would have been realized upon taking this matter up with Dr. McCullough, Provincial Officer of Health.

We received his assurance that he would do all he possibly could to have the neeessary legislation enacted at the recent session of the Legislature. Also, we received from Provincial Secretary Hanna a favorable reply to our request for this legislation. As I said above, I believed that we would now have the necessary legislation enacted, because this matter with other amendments to the Public Health Act, which the Health Officer was requesting, had been approved by the Board, had secured the Ministers' approval and were all signed and ready for presentation to the House. I followed this matter up very closely and know whereof I speak, for only during the last week of the session I was assured that the matter would go through as a department regulation. Then in the shuffle and hurry coming all at the end, the proposed amendments were in some way lost track of and what was our surprise to learn that the session was over and our proposed amendments, among the other changes to the Public Health Act were not passed. There is the satisfaction in knowing that we had the matter farther than it ever was before, and if the members will take the required interest that they should in the matter, we should have no trouble to secure the necessary legislation at the next session of the legislature. Dr. McCullough informed me that he was more surprised than we were that his several amendments were not passed. And upon making enquiry from the Provincial Secretary's Department, he had been assured that in some way his requests had been overlooked in the rush at the end, as it was intended that these matters should have passed the House. Personally, the doctor expressed his regrets to me claiming that as he promised us so faithfully that our requests would be granted, he was very much put out that it had turned out as it had. He also advised that the best thing we could do would be to mark time until next session, when he promised his support to the matter, and felt sure that we would then secure the desired legislation. I only wish to say regarding this matter, that we must not let this failure stop our future efforts, or let the assurances we have received of its passing next session lessen our individual efforts with our local members of the legislature. We should take every opportunity to impress them

Members and delegates leaving the Dominion Radiator Co. after being conducted round their plant.

with the great need of our desires in this matter of the future health of our citizens, and I can assure you that the results will be shown when this legislation comes before the House for enactment at the next session. You have all received copies of the bulletin which the directors decided to issue monthly. Commencing with the March issue, so that the many questions before them from time to time could be placed before each member once a month. This new department awaits the approval or otherwise of this meeting and any suggestions regarding the improvement of the present style and composition of the bulletin will be acceptable. The proposed directory of the members is in a manner included in the bulletin as shown by list of members on back page of same. Those who are engaged in our craft seem to be in the majority of cases of such an illiterant or ignorant class that our calling has not to any great extent climbed out of the lower strata of recognized occupations. The few who see far enough ahead are so handicapped with the great majority of undesirables that we find it almost impossible to improve our own conditions, and do that which we know would be for the general uplift of our calling. Our society is one of the recognized channels for such improvement, and the few out of the great mass who engage in the business and who have become loyal to the society bear out my contention in this matter. Legislation, both municipal and provincial is, maybe, the only means that will ever bring about the desired results for our craft, and if that is so the minority will have to be the aggressors, and bear the burden of such improvement, both with their pocket-book and their time. But their medium of such attainment will necessarily have to be the society. Our society has all the required machinery and power it could wish for. It has had the best possible coaching up to the present time, and I should deeply regret that we should have to lose all that has been accomplished up to date, because of the narrow-minded ideas that are held by the many who will not even pay a paltry annual fee to their own association. How can we ever expect to see ideal conditions existing between us and the manufacturers if we will not organize ourselves into a strong enough body to combat the impossible conditions which the manufacturers set up for us? How can we ever expect to receive sufficient recompense for our ability when we allow conditions to exist that permits any Tom, Dick or Harry to engage in our calling? Are we not entitled to protection from such a class of people who are ignorant of the first rudiments of sanitary and heating knowledge and its scientific principles? Should these ignoramuses be allowed to engage in a calling such as ours, which is so closely allied to the

J. R. HASLET, London.

interests of the health of our citizens? Why tolerate the abuses we have heaped on our heads by the unknowing public just because unscrupulous ones have done, in the past, that which no one in their right mind would dare do? Therefore, let us be up and doing, secure the necessary legislation to make it impossible for these conditions to exist. I know we can do it, but it means a united effort on the part of us all. Keep on asking until you receive that which alone to my mind will place sanitary and heating engineers in that position in your community that demands the respect of all your fellow citizens and not the slurs that have been our lot up to the present.

I trust you will excuse my daring to speak as I have, but I feel the position of our craft keenly and I hope to see the day when we will be the dictator and not the one dictated to.

Thanking you for your confidence in me in the past and trusting that I will retain same in the future, I remain,

Your obedient servant.

G. F. FRANKLAND,
Secretary.

Chairman R. G. Sturgeon of Peterborough, presented the Sanitary Report:

Report of the Sanitary Committee.

Gentlemen: In making my report this year I wish to note that we have somewhat different conditions in our Country to those of last year. A year ago we were at peace with the world. Now we are involved in one of the greatest struggles that has ever been fought since the beginning.

But we are fighting for the grandest cause known. That is freedom of mankind. We also have one of the greatest generals that has ever lived in Lord Kitchener, and we need have no fear of the outcome.

Canada is trying to do her share for the Motherland and is sending her youth and brawn, and I am proud to say that the sanitary engineers are sending their quota, and that they are making a name for themselves and for Canada.

But getting back to my report I might say that we are making progress in establishing a standard plumbing code for all of Ontario. In my district (No. 4) we got that far, that the M. H. O. is compelling all summer cottages, hotels, and passenger boats that ply on waters that are used for domestic purposes, to install septic sedimentation and chemical tanks for the treatment of the sewage. I hope that the rest of the districts are doing the same, as this is a very important point to the health of our people.

In our provincial code I would strongly recommend back air venting to all traps, as in this particular climate, evaporation takes place so rapidly that it is dangerous to use any other kind of venting. I strongly con-

Auto parties at the convention, and one of the sights en route. "Casa Loma," residence of Sir Henry Pellatt.

demn the loop system of venting and under experiment I find that it does not work out properly. If anything, it has a tendency to demoralize our trade. In looking over some of our trade journals of recent date I notice that the Editor (who, by the way, professes to be a strong friend of the craft) is strongly advocating the use of the loop system, under the guise of simplified plumbing, and I would ask this meeting to pass a resolution strongly protesting against such a practice.

I am sorry to state that trade conditions are experiencing a depression just now, and I think if we had capable men at the head of the government we would not have felt the depression as greatly. For instance as soon as the least depression took place they immediately closed all public contracts that were in contemplation. If they had gone on with the public buildings it would have given confidence to the people and that would have tided us over till the money started to flow again.

However, I believe trade conditions will improve shortly.

Thanking you for your attention, and trusting for the future betterment of the craft.

Yours truly,
R. G. STURGEON,
Chairman Sanitary Com.

This was adopted on motion of G. E. B. Grinyer, seconded by S. J. Cherry.

The report of the committee on Heating was presented by Chairman E. H. Barnes of Sault Ste. Marie, together with a copy of a bill to regulate the installation of heating systems, which has been introduced in the Massachusetts Legislature.

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Report of Heating Committee.

As chairman of the Heating Committee for the past year, I am loath to submit my report as to conditions in general, directly pertaining to the Heating Trade, owing to the fact of there being so slight an advancement, if any, from the preceding year. A great many of the past grievances have still been in evidence and undoubtedly time alone with untiring efforts will remedy them. Needless to again enumerate the grievances as they are only too well known to all members of the Society, but still some of them should be kept before the eyes of the craft, for which purpose I will outline a few of them.

No. 1. Travelling salesmen selling to the outsider. There are cases known of their selling directly to the consumers and invoicing goods to consumers at wholesale prices.

No. 2.—Soliciting business directly from prospect and encouraging the cast-away fitter to install the goods.

No. 3.—Soliciting business from hardware stores who never dreamt of entering the business, and they in return digging up a handy man to enter the game.

No. 4. The cutting of prices among reliable fitters in order to compete with above condition.

What are the results? The unfortunate victim who pays his money for the installation is duped. The manufacturers of the heating goods, more particularly the boilers, are condemned and branded by the victim as being no good and the would be fitter generally gets his pay before the work is completed, consequently the victim is sore, he lightens his heart by cursing and cursing the heating trade in general.

The above facts as I have stated are well known to all shops, and I would suggest that the incoming committee work along these lines. I would further recommend getting in touch with D. M. Medcalf, Chief Inspector of Steam Boilers, and see if some measures could be adopted along the hot water heating installations, to protect the general public against such work, or as I might term it, fraudulent practice. I do not see why we could not work along these lines as to compulsory examinations for fitters, such as are in effect in a few of the States of America.

Scarcely a week passes but we are up against competition such as I have just cited. Two men figure on a job for residence heating, one is a legitimate man, the other is a contractor of the "duster" type. The latter underbids the former and gets the job. He installs a system which looks all right, but which doesn't do "all right." The tenant or owner of the house manages, however, to keep warm by the introduction of an auxiliary in the shape of a coil or two. The "floater" has scamped the job from A to Z, and yet the owner may never be the wiser.

The presence of the scamp contractor is a menace to the legitimate trade. He feels no moral responsibility whatsoever, and his methods make for ruinous competition among the smaller men of the trade.

On heating jobs of extensive calibre, the misfit contractor does not figure. He couldn't if he wanted to, it is the average type of heating systems for modest homes and stores, etc., in which these price-cutting incompetents are conspicuous.

Many in the trade believe, in common, that the heating fraternity need some adequate measure of protection against the impositions of the incompetent jack-of-all-trades. The only apparent remedy seems to be the adoption of

R. STURGEON, Peterboro.

an ordinance built on lines akin to those which regulate plumbing, electric and other installations.

Yours truly,
E. H. BARNES.

This report was received on motion of R. G. Sturgeon, seconded by E. H. Russell.

No report was received from the committee on Arbitration in the absence of Chairman J. A. Caslake of Collingwood.

Chairman J. T. Blyth of Ottawa presented the Legislation Committee's report.

Report of Legislation Committee.

In presenting the report of the Legislation Committee it naturally falls under three heads:

(1) Dominion Legislation;
(2) Provincial Legislation;
(3) Local Legislation.

Your committee proposes not only to touch on such legislation as has been enacted during the past year which affects the heating and sanitary engineering business, but also to make suggestions with regard to such needed legislation as will further our interests.

Dominion Legislation.

At the annual convention of the Dominion Association held in Ottawa last year a delegation was appointed to wait on the Hon. Minister of Public Works and present to him a petition asking that in all Government contracts the contracts for mechanical work such as heating, ventilation, plumbing and electrical work be let separately from the general contract. A strongly worded petition to this effect setting out the reasons for same was presented to the Hon. Robert Rogers in person by the delegates appointed and Mr. Rogers promised consideration. So far as your committee is aware, nothing further has been done in this matter. To obtain this desired end it will be necessary to bring pressure through local members of Parliament to bear on the Minister of Public Works. The Ontario Association might well take this up. This line of procedure ought also to be adopted with regard to Provincial Government contracts.

Provincial Legislation.

Workmen's Compensation Act has been adopted and become law, and the burden of same is now felt by all our members.

That the rate as fixed by the Commission for compensation to workmen employed in the heating and plumbing trades at $2 is too high is proved by the vast number of individual protests which have poured into the Commission. It behooves us to take some united action in this matter at our present meeting. As this matter will be thoroughly discussed and illuminated by a member of the staff of the Commission at this meeting, further comment on same will not be made in this report.

Legislation looking to the enforcement of a standard practice for plumbing installation throughout the Province was prepared last year through proposed amendment to the Health Act, giving the Department of Health much wider power and authority but unfortunately these proposed amendments, although prepared and passed on by the Department of Health, were slipped up on when brought before the House during the final hours of the last session. It behooves the incoming executive to watch closely to see that these become law at the next session of the Provincial Legislature.

We are all aware of the legislation now in force with regard to the inspection and installation of steam boilers and the machinery in the form of a department which enforces the provisions of this Act. It is the opinion of your committee that we should strive for further legislation in an extension and broadening of this feature to all installations of steam and hot water heating, with a view to limiting this business to legitimate and competent authorized and accredited individuals or firms carrying out the principles of "Safety First" and protection to the public. Your committee has personal assurances from the manufacturers of heating goods that they would welcome something along this line as the reputation of their product is affected every time a faulty installation is made.

Local Legislation.

Here your committee feels that they are touching on the most important thing that comes before it, because in the ultimate the conditions that confront each individual member in his own home town or locality vitally affect his business, and in proportion as these conditions (we are referring now strictly to local by-laws defining his status) are favorable or not, so is the prosperity of his business. The Master Plumber pays a fee for license to do business in his town or locality. Does he see that he is getting all the benefits to which he is entitled under this license? No work pertaining to plumbing installations should be done in his town unless by or through a licensed master plumber. Is this the case in your town? If the journeyman plumber can undertake the same work as the master plumber, without an investment of capital, without paying business taxes, or workmen's compensation tax, then the conditions are wrong and the master plumber has no protection under his license. If the journeyman plumber can buy at will supplies from jobbing or manufacturing houses materially at the same price as the master plumber, then the latter is at a disadvantage, and has only himself to blame. To remedy such conditions requires united and combined efforts of all master plumbers in local associations. If necessary a higher license fee should be demanded.

Examination for fitness should be insisted on for everyone applying for master plumber's license.

No plumbing work should be permitted unless through licensed master plumbers.

Your committee feels that until such conditions have been met and until master plumbers are working on a basis of legitimate protection under their local license, very little

advance can be made to improve the material conditions. Strong local associations are vital to the success of the Ontario Association.

All of which is respectfully submitted.

J. T. BLYTH,
Chairman Legislation Committee.

The reception of this report was moved and seconded by Messrs. Ross and Sainsbury.

No report was received from the committee

T. B. SMITH,

on Apprenticeship, of which W. Brittain of Hamilton is chairman.

Acting Chairman E. Lewis LeGrow, of Toronto, handed in the report of the committee on Examination.

Report of Examination Committee.

We recognize that the Ontario Society of Domestic Sanitary and Heating Engineers are working for the interests, not only of themselves, but also of those whom they desire to serve. In the beginning of this Society's incorporation it was felt that membership in it should mean something more than social association, that it should be an organization that could and would show a leadership in dealing with and safe-guarding not only its members but the interests of the people whom it serves. A clause was inserted in its constitution allowing all persons engaged in the plumbing and heating business to become members within a period of three months or at the discretion of the Society this period could be extended. This period has now been extended continuously since 1911 until, the present time.

You may ask, "Why the delay in the organization of this committee?" Let us consider for a short time the ideas aroused by a newly incorporated Society, entirely different from any that had previously existed:

1st. The idea that this organization will restrict its members so that it will be more important for the men in the larger centres to become associated with it than for those in the smaller places.

2nd. That the examination will be made so that men without technical training cannot qualify.

3rd. I do not want the Association of Toronto and other places to tell me how to run my business.

4th. Show me what you have done to increase my profits, and if it is satisfactory I will associate with you.

5th. I think $10 a year a lot of money for what is accomplished.

6th. I would not want Mr. No Good in any Association that I would belong to, for I know the kind of work he does and how he gets his material from the supply house and has the owner pay direct, being contented to install this material on a wage basis only.

We may re-enumerate these questions, but sufficient is it for us to say that they are ever present. Now, what is the remedy? If the Government enacted laws that no person could follow the calling of constructing, plumbing and drainage without first showing his qualifications to do so, we would all have to show our fitness or retire to some other line of industry. Why can not we agree to fit ourselves and to instruct ourselves along the lines of the most advanced methods of sanitation without associating ourselves with others in the same line of industry. There is no final reason why it cannot be done: but man is a creature that copies, that demands company and that requires persons of like tendencies to appreciate him and his line of thought, someone to whom he can explain his difficulties and by whom he can be understood. Men of like occupation naturally and unconsciously gravitate towards each other, and if they associate with men who are interested in their problems and understand their peculiar limitations, they become more interested in themselves.

But what has all this to do with the Examination Committee? Just this: Until men in our profession get to understand that association with men of like occupation is in their very best interests and that if they are going to make the most of themselves and of their businesses, it is necessary for them to associate with others in association work and to help pay their share of the obligations, and by their financial support and good will help us all to realize the goal of this Society's ambition, namely, the advance of sanitary science, and to create a public opinion which will be sympathetic and that will follow in line with men who desire to create and to maintain a reasonable standard of plumbing installation. Until we are all educated up to some degree of proficiency, and are satisfied to take a part in advancing this idea, the work of your Examination Committee will be of minor quality. While your committee may appear to be striking at sounding brass, back of it all we see evidences of advance, and would particularly call your attention to the work performed by your Toronto Committee of the O. S. and D. S. H. E. After some two years of continuous effort and close application to the subject, they were instrumental in having the Health Department recommend to the City Council that a by-law be passed compelling the passing of an examination for all persons desiring to engage in the plumbing business in Toronto. This recommendation was passed by the City Council and took effect December 99, 1914, and we expect that as a result of the passing of this Act, the men who desire to engage in the plumbing business will at least know the rudiments of sanitary science. We think that the whole question of examination for new applicants should be referred to the new Examination Committee, who during the coming year should compile data and secure information that will be available for use at the discretion of the board of directors. Attached to this report is a copy of Toronto by-law covering the application of applicants for a plumber's license.

All of which is respectfully submitted.

LEWIS LEGROW,
Acting Chairman.

No. 90.' A BY-LAW

To amend By-law No. 23, with reference to the licensing and regulating of plumbers.

Passed December 29th, 1914.

The Board of Commissioners of Police for the City of Toronto enacts as follows:

I.

By-law No. 23, respecting the issue of licenses for the City of Toronto, is amended by striking out clauses 34*a*, 34*b*, 34*c* and 34*d*, under Section XXXIV., and by substituting the following therefor:

XXXIV*a*.

Every plumber carrying on his trade, business or calling in the City of Toronto shall register his name and address at the office of the Plumbing Divisions of the Department of Public Health in the said City, under such rules and regulations as the said Department shall prescribe, and receive a certificate that he is entitled to a license.

XXXIV*b*.

No plumber, who is not already licensed and recognized as in good standing with the Department of Public Health, shall be entitled to receive a certificate that he is entitled to a license unless he passes an examination to the satisfaction of an authorized Examining Board composed of the Medical Officer of Health, or one of his staff, and two plumbers, one to be a master plumber, and one a journeyman plumber of not less than ten years' experience, to be named by the Medical Officer of Health, and the Chairman of the Local Board of Health.

XXXIV*c*.

Upon and immediately after the passage of this by-law, every person desiring such certificate shall file, with the Chief of the Division of Plumbing and Drainage of the Department of Public Health, a petition in writing giving the name of the applicant, and in case of a partnership, the name of each member thereof, together with the place of business, and asking for a certificate that he is entitled to a plumber's license.

XXIV*d*.

Any change of the firm or location of the business of the applicant or his firm shall be promptly reported to the Chief of the Division of Plumbing and Drainage, and also to the Issuer of Licenses.

XXXIV*e*.

Every applicant for a plumber's license shall file with the Issuer of Licenses the certificate hereinbefore referred to, and shall thereupon be entitled to a license as a plumber, for which license such person shall pay each year at the time of the issuing thereof such sum as shall be fixed by By-law of the Council of the City.

XXXIV*f*.

A partnership of two or more persons desiring to carry on the business of plumbers may do so upon each person obtaining the license hereinbefore provided for.

XXXIV*g*.

Every such license shall be for the year current at the time of the issuing thereof, which shall expire on the 31st of December next succeeding the date of the same.

XXXIV*h*.

Upon satisfactory evidence furnished to the Board of Commissioners of Police that any plumber has been twice convicted of any violation of the provisions of this By-law, or of any of the By-laws respecting plumbing, drainage, sanitary matters or waterworks, the Board of Commissioners of Police may declare the license of such plumber forfeited and thereby such license shall be cancelled.

B. NOBLE, London.

XXXIV*i*.

Any plumber whose license shall be declared forfeited by the said Board of Commissioners of Police, as hereinbefore provided, shall not be again entitled to a license until the said declaration of forfeiture shall be revoked by the said Board.

XXXIV).

No person shall carry on business as a plumber in the City of Toronto unless he is the holder of a license issued as hereinbefore provided, and is of the full age of 21 years.

H. C. HOCKEN,
Chairman Board of Police Commissioners.
H. J. GRASETT,
Chief Constable.

Mr. LeGrow was appointed in place of Chairman C. H. Hoople of St. Catharines, who has lost the sight of one eye as the result of an accident, and has thus been unable to undertake any additional work. He is still in the doctor's hands. G. Clapperton moved, and T. Maxwell seconded, the motion to receive this report.

The reception of the Educational Report, presented by Chairman G. E. B. Grinyer of London, was moved by E. Currie and seconded by G. Cooper.

Report of Educational Committee.

Gentlemen:

As no meetings have been held there is no possibility for any report on same. I outline, however, a few of my views which appear below.

There is no doubt in my mind, that one of the best instructors we have for our trade today is the trade paper. It has done more toward putting our society on the map than anything else I can think of. He who reads his trade paper, and understands what he reads, is in sympathy with his fellow craftsmen to a greater extent than the man who doesn't. You will find he is a thinker and very much of an enthusiast. Generally speaking, he will exert a good deal of force in his association, and is, on the other hand, a far more practical fellow all round than the one who does not interest himself in his paper. What does it stand for? It first keeps us posted on all the current news that is of interest. It compels our attention, and forces our thoughts into action. Our enthusiasm is developed, and we push along to a higher plane of success. It stands for progress, puts into the reader a clearer idea of his responsibility to his fellow tradesman.

Twenty five years ago sanitation was in its infancy, but to-day we are the most necessary band of engineers that humanity requires. The class of men best fitted to enter the field of sanitation, will be those who read and learn all they can from trade papers, as well as the knowledge they acquire from practical experience. The trade papers are the medium whereby men with different views on subjects pertaining to their trade, can voice them in an unbiased manner. We receive experience both practically and theoretically from those who devote their time exclusively to studying the most vital problems in the trade, and at times when certain problems are most reasonable. No trade in existence can show such varied problems as that of the sanitary and heating engineer. When one looks back to the time when we were all "Plumbers," and considers the changes which we have passed through, and then takes down one or two old books dealing with problems as they were found at that day, how contradictory some of the ideas held at that time have been found to be.

Much has been said along the line of technical education. It is about the only solution in the opinion of the sanitary engineers that will help to put the calling of those engaged in the trade on a good sound basis. From a practical standpoint, much is lacking, and from a monetary view it is anything but rosy. If the business of sanitary and heating engineers is to be improved, we as a whole require more business education, and it is only by hard study that we will ever appreciate the actual cost value of our labors and thus charge for those labors—at the same time being sure that fair value is being given. It would be a very conservative statement to make, if one said that less than 50 per cent. who are at present actually engaged in the trade are really competent, all because of the lack of education that can be acquired by studying in our spare time. We as a craft have accomplished more of late years than any other calling in the building trade, but at what cost! We venture to say that, as a whole, there has been less profit accumulated per cent. than in any other trade. There are men in the sanitary and heating business to-day who, if they had been engaged in any other calling, and had devoted the same energy to it, would have been thousands of dollars in pocket. But why? We have not been prepared, we have not devoted sufficient time to study. We have been content to forge ahead over the thousand and one obstacles rather than clear them out of our path. The contented man is he who lives at peace with his neighbors. The successful man is he who makes the best use of his neighbors.

The successful sanitary engineer of to-day needs all the help he can get from everybody who will help him. There are plenty of days when you have time to spare, time to get out and see what kind of men the other fellows in business in your section are.

Co-operation among business men is the keynote to some of the big successes of the future. Instead of a few monopolistic successes, we will have a closely knit association of smaller shops, buying together and working together for our mutual advantage. Such organizations are already making good in some lines, and are proving themselves to be serious factors, with ability to secure special terms from manufacturers and to uphold prices in face of the cut-rate tendencies of price slashing competitors. Any single small operator is no match for the strength of big competition; but let a dozen, or fifty, or even three master sanitary engineers combine their strength and set out to hold the business that is justly theirs, and the bigger man will find he has struck a snag when he tries to take it from you. All advice is good if carefully considered, for whether good or bad, it serves it purpose to make us think.

Thought will soon bring each of us to the correct solution of his individual problem. I maintain that every success has behind it an inevitable cause. Of course, the principles I have enumerated are only of value to you in proportion to your efforts in building for the future, and without such efforts you do not need an influx of modern merchandising principles into your business. Money cannot buy the education that has been acquired in the school of hard knocks.

Yours very truly,
GEO. E. B. GRINYER,
Chairman of Education Committee.

The report of the delegates who attended the Canadian Society's Convention in Ottawa (President H. Hicks and Secretary G. F. Frankland), was taken as read on motion of E. H. Russell, seconded by G. Clepperton.

Delegates Report.

The delegates' report read as follows:

As your delegates to the 19th Annual Convention of the Canadian Society of Domestic Sanitary and Heating Engineers, which was held in Ottawa on June 9, 10 and 11, 1914, in St. Patrick's Hall, we wish to make report as follows:

There were in attendance thirty delegates and among the many questions before the convention the following are a few, which were of most importance to our Society.

President McKinley welcomed the delegates and referred to the Canadian Institute of Sanitary Engineers as existing in the Western Provinces. He expressed the wish that the Eastern Provinces would adopt something along the lines of the Canadian Institute, so that we should realize a standard plumbing ordinance for the whole Dominion.

Bulk or general contracting as it effects plumbing and heating engineers, was taken up at great length. A deputation from the Society waited on Minister of Public Works Rogers, when the following resolution was placed before him:

Resolution on the Elimination of the general contractor, or the separation of mechnical equipment from Government contracts to include plumbing, heating, ventilation and electrical equipment.

"Be it resolved that the Canadian Society of Domestic Sanitary and Heating Engineers in Annual Convention assembled at Ottawa on June 9, 1914, hereby and do present the following resolutions to the Government officials for the direct awarding of all contracts of mechanical equipment to be installed in all public buildings throughout the Dominion of Canada to include all plumbing, heating of all description, ventilation and electrical construction.

"That all contracts awarded for plumbing, heating, ventilation and electrical construction amounting to $1,000 or over be let direct to the specialists in the various branches of plumbing, heating, ventilation and electrical construction.

"That it is essential to the best interests of these various branches on plumbing, heating, ventilation and electrical construction as the general contractor, as a whole, is not financially responsible nor capable of carrying out or fulfilling the requirements or specifications as required by the Government.

"The general contractor not being skilled in all these different branches of mechanical equipment, such as plumbing, heating, ventilation and electrical construction, is not capable of passing on the efficiency of the various works installed, thereby relying on the now so-called sub-contractor to install the work as per specifications.

Delegates and members of the Ontario Society Convention.

"The general contractor is not and never was entitled to commission for supervising the work of installing or constructing the plumbing, heating, ventilation and electrical construction in any public buildings owned by the Government.

"That we, the specialists on plumbing, heating, ventilation and electrical construction are held responsible for work installed in said public buildings, should, and we hereby pray that the Government of the Dominion of Canada, or its officials, shall and do let and award all contracts for plumbing, heating, ventilation and electrical construction direct, where the said contracts amount to $1,000 or over."

The resolution was signed by the following: Mr. Godwin, Nova Scotia; Mr. Dorman, New Brunswick; Mr. Russell, London, Ont.; Mr. Blyth, Ottawa, Ont.; Mr. Hicks, Toronto, Ont.; Mr. Gordon, Montreal, P.Q.

The Minister of Public Works replied that he would confer with his Department regarding the request of the Society, promising that every consideration possible would be given same by himself and colleagues.

Representation on all local health boards by our trade was earnestly requested, and in this connection, we should mention that during the convention Dr. Hodgetts of the Dominion Commission on Conservation addressed the Society, promising his support in our endeavors for further legislation along these lines.

The changing of the Canadian Society into an executive body only, was before the convention quite a while for consideration, and while this matter was one that your delegates had explicit instructions to have effected, we would place the following details before you for your consideration as to why your instructions were not complied with. Previous to the opening of the convention, a caucus was held wherein the Montreal delegates insisted that the Canadian Society continue to be as in the past; stating that if the Ontario delegates insisted on pressing their motion that the Canadian Society become an executive body only, they would have to withdraw from the Society, according to instructions from their Society, as they had a resolution with them, whereby they were instructed to withdraw if the Canadian Society became an executive. The delegates from the Maritime Provinces took the view that if Montreal did as they proposed doing, there would be no connection between the Maritime Provinces and Ontario, that the benefit of the Canadian Society would be lost to them if such a gap existed and expressed the wish that the Ontario delegates should consider their situation in the matter before pressing their resolution. The Montreal delegates remaining firm in their stand, the Ontario delegates consented to waive their rights for the time being and bring the matter up in Convention and debate their contention on the question before the members assembled. The Montreal delegates presented their notice of withdrawal, and it was placed on the table for six months. A motion by J. T. Blyth, seconded by G. F. Frankland, as follows, was placed before the meeting:

That at the close of this convention the Canadian Society as now constituted be assembled into a purely executive body.

That an executive body be selected.

That this body consist of a president and secretary-treasurer to be elected for a term of three years together with an executive committee comprised of the presidents of all Provincial societies, or of local societies where no provincial society exists.

That the up-keep of this executive body be borne by an equal annual assessment on all provincial associations.

That on the expiry of the term of office of the president of the society and also the secretary, new officers to take their places be selected by a mail vote of presidents of all provincial or allied societies.

That this executive body have supervision of all our matters of national importance.

That the president and secretary-treasurer of this body will once a year hold a session with and at the same time as some provincial association to be selected by them.

That a committee be at once named by the president to further elaborate the detail of the above proposition.

Your delegates could have accomplished their instructions, as the attendance at the convention will show you. Of the thirty delegates present only six were present from outside Ontario, three from Montreal and three from the Maritime Provinces, while six members from London, five from Toronto and thirteen from Ottawa were in attendance. So this Society can readily see that an executive body is the proper thing for the Canadian Society from the number of those who did attend the last convention in Ottawa. There was not a member in attendance from anywhere west of London, reports only having been received from the vice-presidents of Saskatchewan and Alberta. Moreover, if your delegates had wished to use the power of their majority at the convention, we could have carried everything we wished, but being desirous to conserve the rights of the minority we did not press our instructions. The delegates of the Maritime Provinces, while they voted for the Society to continue as in the past, promised the Ontario delegates that if they would forego their wishes in this matter for 1914, they would be willing to reconsider the matter at the 1915 Convention which will be held in St. John, N.B., on June 22, 23 and 24. They stated that they would have a full-fledged convention at that time, and if the operations for

F. R. Maxwell and John Wright, two Toronto standbys.

the year did not prove successful under their care, they would be willing to agree to have the Society changed into an executive body, as they believed that if they had the reins of office for a year they would be able to lift the Society into its proper place.

Your delegates were successful in having the convention adopt a fixed per capita subscription of one dollar per member, according to the following resolution of the audit committee: That the per capita tax be struck at one dollar per member and this amount be collected at once. While we accomplished our desires in this matter, we are sorry to state that when it came to paying the per capita subscription of the Ontario Society, we had no funds on hand. We expected that we would receive from the Ottawa Committee the amount of their indebtedness to the Ontario Society, which amounted to $184, when we arrived in Ottawa, and we intended to transfer the required amount to the Canadian Society for the Ontario per capita subscription, which amounted to $130. We did not, however, receive the Ottawa dues, and were therefore unable to pay the Ontario per capita subscription to the Canadian Society. This amount is still owing.

Technical education was discussed and the expression of all present was that this will be the means of raising the standard of those engaging in our craft in the future.

The manufacturers and jobbers were met by the convention in conference on June 11th, 1914.

This conference was similar to meeting held by the Ontario Society with the manufacturers in May last.

The same requests were made upon the manufacturers with the result that the plumbing houses considered our proposition more favorably and promised to consider our requests. The heating houses were prone to concede to our suggestions but insisted upon arguing the different questions with a view to maintaining that they were doing no wrong and if any wrong existed it was on our side and not theirs. They would not commit themselves in any way and we claim it only goes to show the greater need of organization on our part, to combat the many evils that are arising every day in this branch of our business. Anyway we believe that the changes that have taken place in connection with trade discounts during the past few months are in some degree due to this meeting. The following was the resolution placed before the manufacturers at this meeting:

"That whereas it has come to our attention that certain supply houses are extending credit to so-called trade which is not legitimate trade, and that, far beyond the terms of credit, as usually granted, our Society condemns with vigor such practice, and in general would ask that the supply houses solicit trade only from those who are creditably employed in business, and insist that terms of credit be strictly and uniformly enforced. That in the interest of legitimate trade we ask that the supply houses and manufacturers, either directly or through their representatives, refrain from taking off quantities or making estimates for anyone or for making specifications or plans.

"That we deprecate the practice followed by certain plumbing supply houses, when having arranged a specification for an architect, they quote to the trade bulk prices on their goods specified, unless they are in a position to furnish the trade with catalogues and discount sheets applying to each and every individual item on such specification, and such bulk price be found to accord therewith."

It was moved by Mr. Russell of London, Chairman: Seconded by Mr. Godwin, Montreal, —that the Twentieth Annual Meeting of the Canadian Society of Domestic and Sanitary Engineers be held at St. John, New Brunswick, in June, 1915.—Motion carried.

The election of officers and appointment of committees resulted as follows:—

President, G. S. Dorman, Moncton, N.B.; Vice-President, E. H. Russell, London, Ont.; Secretary and Treasurer, W. C. Crawford, St. John, N.B.; Provincial Vice-Presidents, James Marr, Calgary, A. J. Hammond, Winnipeg, J. Anderson, Vancouver, J. E. Godwin, Halifax, D. Shaw, Charlottetown, H. B. Roundtree, Swift Current, J. Shea, Fredericton, F. R. Maxwell, Toronto, John A. Gordon, Montreal, Chairman of Apprenticeship Committee.—Geo. Clapperton, Toronto, Chairman Essay Committee.—F. Dexter, Truro, N.S. Heating and Ventilating Committee.—R. G. Priestly, Edmonton, Alta. Sanitary Committee.—P. C. Ogilvie, Montreal. Legislation Committee.—J. T. Blyth, Ottawa.

It was moved by Mr. Gordon, seconded by Mr. Smyth, that the secretary cast the ballot for the officers named.

Copy of the report of proceedings of the Convention is on file. If any member should like further information he can secure same from Secretary Frankland. We understand that all members will receive a copy of report as committee is attending to same and securing advertisements to finance its publication. We only wish to add that upon going through this report, it is very noticeable that if the Ontario Society had not been represented at Ottawa by anyone, the report would only have been about one quarter of its present size, as the different reports that were taken up, and the discussion in general show that Ontario was the most active of any represented at the Convention.

Thanking you for your confidence in us as your delegates and trusting that the above

report will meet with your approval. We beg to remain,

Yours respectfully,
Delegates to the Canadian Society
of D. S. H. E.

Convention, Ottawa, 1914.

HARRY HICKS,
President.
G. F. FRANKLAND,
Secretary.

All the aforementioned committee reports, together with the report of the delegates to Ottawa were handed on to the committee on resolutions, on the motion of Messrs. Sturgeon and Clapperton.

The resignation of C. H. Hoople of St. Catharines, was received and accepted with regret, and Secretary G. F. Frankland was instructed to write to Mr. Hoople, expressing the executive's regret at Mr. Hoople's accident and consequent ill health, hoping that he will rejoin the association when he recovers his health, and returing the dues for 1915. The covering motion was made by Mr. Cooper and seconded by Mr E. H. Russell. Mr. Hoople's son, who is associated with him in the business, is now on active service with the Third Contingent.

The payment of a printing account to Fred Smyth was approved on motion of Messrs. Sturgeon and LeGrow.

The resignation of Thompson Winters of Berlin, and that of J. A. Langelier of Ottawa, were laid on the table, both on motion of L. E. LeGrow, seconded by Geo. Ross of Brockville.

A recommendation of the directors that the Society should take advantage of clause 101 of The Workmen's Compensation Act, was passed on to the resolution committee.

DIRECTORS' RECOMMENDATION TO SOCIETY..

In Convention, mover Mr. Farrell, seconded by Mr. Mahoney. The Directors recommend that the Society take advantage of Clause 101 of the Workmen's Compensation Act, adopt necessary by-laws appoint an inspector and apply to the Workmen's Compensation Board for authority to act on behalf of those included in our group of class 35 of the Workmen's Compensation Act of Ontario as provided for in Clause 101 of the Act.

Some concrete instances of manufacturers selling their product to individuals outside the trade were cited, and Messrs. Cherry, Russell and Ross appointed a committee to consider the evidence and suggest what action should be taken.

The executive meeting concluded its business at this point.

The Fourth Annual Convention of the Ontario Society of Domestic, Sanitary and Heating Engineers assembled in the Canadian Foresters' building, 22 College street, Toronto, on Friday, April 23rd, at ten o'clock a.m. There was an excellent representation from outside points, particularly London. President Harry Hicks, calling the convention to order, remarked that there was no ceremonial opening this year and no city councillors to shake hands though he was pleased to see a real live Mayor present in Mayor Mahoney of Guelph, a member of the association. Mr. Hicks welcomed those present.

The Secretary then called the roll and the following members were present:

MEMBERS PRESENT.

Harry Hicks, Toronto; E. H. Russell, London; George Clapperton, G. F. Frankland, E. Leslie Le Grow, L. E. Maxwell, Toronto; Geo. Ross, H. S. Brown, Brockville; Harry Mahoney, Mayor of Guelph; Fred rick Smith, Geo. E. B. Culpeper, Guelph; C. F. Needham, Jas. R. Hastings, Benj. Noble, F. Rich, Edw. Holland, John Leggett, London; Franz Rudow, Elmira; Louis Lang, Toronto; S. J. Cherry, J. L. Farrell, North Bay; F. Saisbury, Weston; R. G. Sturgeon, Peterborough; J. J. Blyth, G. H. Currie, Ottawa; W. A. Spalding, Preston; C. R. Myers, Stratford; Thos. Maxwell, T. B. Smyth, A. F. Lamoure, J. F. Fullerton, Geo. Smye, Thos. H. Ferguson, John Wright, F. E. Wright, Geo. A. Kingston, H. A. Harding, Frank Clifton, H. J. Hillier, A. H. Read, F. E. Ellis, Harry Rudgick, Geo. H. Cooper, of Toronto.

The minutes of the last annual meeting then came up for discussion and were taken as read on the motion of F. R. Maxwell of Toronto, and H. S. Brown of Brockville.

The minutes of the executive committee which met on Thursday afternoon, April 22 were also, read by the Secretary, and passed, on motion of S. J. Cherry, North Bay and T. B. Smyth of Toronto. A short period was then devoted to the collection of fees.

The report of the resolution committee was then brought in by Chairman E. H. Russell of London, who, together with E. L. Le Grow and G. E. B. Grinyer had been appointed a committee for this purpose.

THE REPORT.

Mr. President and Gentlemen. The Resolution Committee reports as follows on the numerous reports submitted.

Report No. 1. Your committee recommends that the directors continue the work in reference to the Workman's Compensation Act re the appointing of an inspector in connection with our class.

Report No. 2. We would like a representative to attend the National Convention but

F. RUDOW, Elmira.

wholly at his own expense, the Ontario Society being unable to provide the necessary funds.

That the society continue its active campaign in reference to the Public Health Act, with the object of it being made provincial law at the next session.

That heating specifications be adopted; copies may be had by members on request from Secretary Frankland.

Report No. 3. We recommend that the stamp as per copy attached be on all estimates, letterheads, bills, etc., in reference to The Workman's Compensation Act.

The stamps referred to are as follows:

A stamp bearing the words:

"Assessment of Workmen's Compensation Board Paid for Current Year."

to be impressed on all Bills, Tenders and Letterheads, showing that the firm are safe to do business with for the current year. (See Act, p. 31, Cl. 98.)

On all bills the last item shall be stamped as follows

"To Workmen's Insurance.....30c."

This is on $10 worth of labor. Whether 3 per cent. will be sufficient, time will determine. The main thing now is to educate the public, they soon get used to a new tax.

Report No. 4. That the treasurer's report be read, and that the secretary act as delinquents' names are marked by special committee.

Report No. 6. Sanitary committee. Thanks are due section 4 for its work, and we recommand that this be all included in the Provincial Act.

Report No. 7. Heating committee. That the directors consider the necessity and advisability of obtaining legislation governing heating installations, power and ammonia systems, and that the matter be taken up with D. M. Metcalf, Chief Inspector.

Report No. 8. Legislative committee. We recommend this to the incoming board and if time permits, that it be read in open convention.

Report No. 9. Examination committee. We recommend that this be received and passed by the incoming directors. We are pleased that the Toronto committee has sueceeded in securing a working board.

Report No. 10. Educational committee. That this be referred to the new board and thoroughly considered.

Report No. 11. Delegates report. That this be referred to new board and if time permits, be read in convention.

Report No. 12. That this be read in convention.

Report No. 13. That the correspondence re action of certain manufacturers be taken up by this convention.

It was then decided to take up and discuss this report, clause by clause, on motion of Messrs. R. G. Sturgeon and Sainsbury.

Clouse 1. President Hicks explained that the society had power to appoint an inspector in connection with the Compensation Act to look after the interests of the trade. The duties of such an official would be to see that all parties paid their shares of assessment; and that any malingering be stopped. It would be of material benefit to all.

Vice-president Russell read the extract from the Act governing the appointment. "You can cee the advisability of taking advantage of this," he said. "The inspector sees that all hazards are reduced where possible, and that the fund is not defrauded by unfair claims. We should take advantage of this opportunity by all means."

Mr. Sainsbury suggested that the matter be left over until afternoon when a commissioner of the Act was to address the convention. This was agreed.

Clause 2. The convention decided to send delegates to the Canadian Convention. The secretary was instructed to write and see if any members were going. This action was taken on motion of Messrs. F. R. Maxwell and Brown.

An active campaign with reference to the Public Health Act was advocated and it was left in the Directors' hands to make every effort to have a sanitary code legalized. The proposed code will be published in a future issue of The Sanitary Engineer. F. R. Maxwell desired to hear from outside members on the subject of the sanitary code, as he considered it would deeply benefit those resident in the country. He thought that outside members did not take enough interest in the matter.

E. H. Russell said that it was essential that the outside sections of the society should take the matter up. He expressed his intention of bringing the matter before the London Board of Health.

S. J. Cherry, of North Bay, asked how the Government would be able to enforce such a by-law.

The President said that the matter had yet to be arranged. "We have, however," he added, "the promise of the Provincial Secretary, that the matter will be legislated early next Session. The Provincial Secretary has expressed his intention of applying to this society for a committee to meet with his engineers and draw up a suitable plumbing code for the province."

He also said that Toronto would not be affected by the measure, as the plumbing code in the city was second to none in the world except for tile drains. In the country, however, it was left to the individual plumber whether good work should be done or not.

Mr. Maxwell said that the country members of the association must work through their local members of the Legislature, to get the necessary pull in Queen's Park. He considered the measure the best thing that had ever happened to the people of Ontario.

Mr. J. R. Haslett wanted to know if it were intention of the committee to advocate compulsion for every town to have a permanent inspector. Such, he said, would be unfair in small towns. Where are you going to draw the line?" he asked. "If it is not drawn the legislation will become a dead letter."

Mr. LeGrow said that the measure should be enforced in all towns with sewerage and water works. He regarded it as a minimum measure and thought that it would be enforced by the Provincial Inspector.

Mr. Mahoney suggested that the Government should apply district inspection after the manner of the Hydro-Electric System. The measure he said, was of interest to men in rural municipalities, but of still greater interest to men in the cities, as these would benefit by the elimination of the unskilled men, now working in the country, and enable them to enter the country field. He urged that every effort should be made to rouse province-wide interest and strengthen the hands of the directors, promising to do all in his power in his own district (Guelph).

Mr. J. R. Haslett thanked Mr. LeGrow for his explanation, and laid stress on the importance of appointing competent inspectors, rather than leaving matters in the hands of district health officers. Qualified men, not doctors were needed to fill the posts. He agreed with the suggestion to appoint district inspectors similar to those of the Hydro Commission, but doubted whether anyone in the house was sufficiently interested to insist on such appointments. "The act is good" he concluded "but will it be operative or just a dead letter, when passed?"

Secretary Frankland stated that up to the present, the Provincial Health Board has had no general jurisdiction over plumbing. The society had suggested the insertion of a plumbing clause and code. This, he said had been recommended by the Provincial Secretary. It was already compiled, and, though overlooked this session, would certainly be passed as soon as the legislature met again. He read clauses of a code drawn up to meet existing conditions by the society. This made inspection necessary in all towns with a sewerage system.

Mr. Mahoney pointed out that comparatively few towns in the provinces had sewerage systems, including towns with a population of as much as three thousand. He suggested that the regulations should be made to apply to all towns possessing a waterworks.

Mr. Sturgeon agreed, saying that the regulations were most needed by comparatively small towns. Mr. T. Ferguson agreed with him.

Mr. S. J. Cherry pointed out that in his own town, many houses had a water supply, but would not be connected with the sewerage system for years. Towns such as Sturgeon Falls and Sudbury, he said, had had plumbing by-laws for years, but they were inactive for want of inspectors to enforce them. He cited other Northern towns which were waiting to see what the Provincial by-law would demand. The medical health officer in his own district (North Bay) he said, was in full accordance with the scheme.

Mr. Mahoney said that the very printing and passing of the act would force the hands of municipalities throughout the province. He cited the case of the building laws, which provided that inspectors should be appointed by the government in all cases where municipalities neglected to make appointments.

Mr. Maxwell stated that the compilers of the code which the society had before them, had not overlooked any point which had been brought up, but had intentionally made an easy start.

Mr. Mahoney answered that the object of the regulations was to enforce proper plumbing in all houses, not complete sewers. There were a very large number of towns which had waterworks, but no sewerage systems. "What we are concerned with," he said, "is plumbing in houses. Sewerage systems come under the jurisdiction of the Provincial Board of Health. We want good plumbing regulations enforced within all dwellings.

President Hicks suggested that the regulations should be made to include all plumbing in the province. "I dont't see why closets should not be put in right, even in the country," he said.

Mr. Mahoney made a motion that the regulations should be broadened to include all towns with waterworks. Mr. G. Clapperton seconded the motion, which was carried. Mr. Haslett expressing the opinion that too drastic a start was being made.

Clause 3. The Vice-President's suggestion with regard to the use of a stamp on all letterheads, bills, etc., in connection with the compensation act was adopted.

AFTERNOON SESSION.

The afternoon session was opened by President Hicks who read the following telegram from G. S. Dorman, President of the Canadian Society of Domestic, Sanitary and Heating Engineers:—"Best wishes for a large and successful convention—extend my best wishes to all the boys—hope to meet you at the St. John convention."

The following report from the auditors was then adopted. "We, the undersigned auditors of your society, having audited the books and vouchers of the secretary and treasurer for the year ending January 31st, 1915, and having found the same correct; wish to express our appreciation of the able manner in which the books have been kept during the past year.

"We find, by the secretary's books, that there is over $1,200 in dues owing the society, but as this has been referred to a special committee, there is no doubt that it will be handled in an able manner.

Respectfully submitted,
THOS. MAXWELL,
G. ROSS, Auditors.

Clause 5. This, the secretary's report was considered with that of the treasurer, on the President's suggestion, as both covered much the same ground.

Clause 6. The convention decided in favor.

Clause 7. The heating report. Mr. Sturgeon suggested that it be passed on to the new directors. President Hicks did not agree.

Mr. J. E. Farrell said. "I think we want to stand at the head of this work, and any move we make should have our very serious consideration. I advocate leaving the matter in the hands of a committee of men specially experienced along this line, and I think we should give them a reasonable time, say three or six months, in which to consider it. Mistakes are only too easy when things are hurried.

President Hicks, said that the society was not trying to hurry the matter, the question, however, was, who was the best party to hand the matter over to? His own experience had been that the executive committee did better work and accomplished more than any special committee, possibly because it was oftener in session.

On motion of Messrs. Maxwell and Ross, the matter was handed to the incoming board of directors, that a committee of three should be nominated by them to handle it.

Clause 8. This report was read by the secretary, and the convention decided to receive and act upon it, on motion of Messrs. Ferguson and Simons. President Hicks again urged the advisability of all members of the association getting in touch with their members in the legislature in order to arouse interest in sanitary legislation in the house.

At this point Commissioner Kingston of the Workmen's Compensation Act addressed the convention.

Following Commissioner Kingston's address the convention returned to the consideration of the Treasurer's report.

President Hicks stated that there was a deficit of $344.16 as the result of the evasion, by a number of members, of their liabilities. The executive, he said, had exhausted all means in their power to get the dues in, and the convention must now devise some other ways and means.

Mr. E. H. Russell, chairman of the special committee appointed to consider the report, said that due consideration had been given the report and various items had been marked for the instruction of the secretary as to the best course to take. The special committee had then passed the report on to the resolutions committee. The raising of the deficit, he said, was a question in urgent need of consideration by the convention.

The President asked how many members still retained their certificate of membership, but had not paid their dues.

Secretary Frankland replied that nineteen individual members, and twenty-three in committees were in this position.

Mr. Sainsbury advocated the removal of these 'deadheads' from the membership list, and the levying of a special assessment on the remaining members.

Mr. Spalding of Preston, advocated either the suing of the delinquents or, as an alternative, putting the matter in the hands of a reliable collection agency.

Mr. LeGrow in a strong speech, dealt with the existing dissatisfaction among many members, which had led to a certain extent to the present situation. He considered the question to be the strengthening of the association, and the finding of some means to get all members back into line once more.

Mr. Mahoney drew attention to the fact that the association was an incorporated company entitled to charge and collect annual fees and dues. He advocated that this should be done as it was unfair to ask the hundred and fifty remaining members to submit to an additional levy. It was too easy, he thought, for men both to enter and quit the association.

Mr. LeGrow advocated a peaceful attempt to collect outstanding dues. He suggested those present should raise $100 and send the secretary to all points east of the Twin Cities to explain the situation.

Others who discussed the question included Messrs. Clapperton, Farrell and Maxwell.

Finally the following motion and amendments were proposed and seconded. The amendment to the motion carried.

Motion.—That the secretary carry out the recommendation of the resolutions committee and sue those in default, and that an assessment to cover the present deficit be levied.

Amendment to motion.—Proposed by Mr. Sturgeon, seconded by Mr. Sparling.—That a levy be made to cover the present deficit, and the balances in default be collected through an agency; that agency may be the present secretary.—Carried.

Amendment to amendment.—That all delinquents be struck off the list of members; that their certificates and constitutions be secured, and if such delinquents wish to be re-instated, they be required to pay all arrears of dues; and that an assessment be made to cover the present deficit.—Lost.

The estimate for the present year, and the appointment of a secretary were then discussed.

Mr. Mahoney moved that the matter be left in the hands of the directors. The motion, however, was not seconded.

Mr. Russell pointed out that the secretary had been engaged just for one year.

President Hicks said that it would be impossible for the affairs of the society to be closed or carried on without a secretary. The secretary must be retained for some time at least.

To expedite matters, Mr. Russell suggested that the association should retain Mr. Frankland's services for a time, and recommend him for the post of inspector under the workmen's compensation act.

Mr. LeGrow suggested that the association should decide whether or not it could afford a secretary, and in the latter alternative, asked if a few members could not put up a few dollars apiece and retain the present official. Mr. Haslett agreed.

The following motion was carried unanimously,—Moved by Messrs. Farrell and Mahoney, That the directors take advantage of the appointment of an inspector under clause 101 of the Workmen's Compensation Act.—Mr. Frankland was named as the candidate.

A motion to retain the secretary for another year put by Messrs. Smith and Myers was also carried.

Mr. Sainsbury asked if Mr. Frankland could combine the duties of Inspector and secretary, part of his salary to be born by each employing board.

President Hicks said that the Workmen's

Compensation Act's provisions would admit such an arrangement.

The convention then resumed the consideration of other items of the report of the resolutions committee.

Clause 9. was approved, on motion of Messrs. F. Maxwell and L. Gies.

Clause 10 carried on motion of Messrs. Sturgeon and Maxwell.

Clause 11 was taken as read on motion of Messrs. Mahoney and Russell

Clause 12 was adopted.

Clause 13. Regarding a series of letters received on the subject of manufacturers' sales to individuals and firms outside the craft. Vice-President Russell read a summary of the ground covered, citing actual cases involved.

The chief trouble was the habit of certain manufacturers selling goods to contractors at the same or even lower prices than to regular heating engineers. Mr. Russell urged that the practice of letting heating work in general contracts should be stopped. The manufacturers, he said had written him expressing their willingness to do what they could do to assist heating engineers, and remedy their grievance

Mr Farrell said that the manufacturers had the heating trade by the neck, and would sell to consumers if they wanted to. They will install heating plants in buildings, underbidding the legal heating engineers, who buy from them. Manufacturers, he said, consider themselves authorized to sell to contractors, school boards, mining companies and, in fact, everybody who has the money to pay for a heating plant.

We therefore beg to affirm that the definition of the word "trade," as used on special request is, he as follows:—

"Those regularly carrying on the business of Sanitary Plumbing, Heating and Ventilating, and the Dominion and Provincial Governments."

President Hicks pointed out that the heating manufacturers were in session in Montreal on Monday and suggested the forwarding of a protest to them.

On the motion of Messrs. Farrell and Grinyer, the secretary was instructed to send such a letter of protest to the meeting of boiler and radiator manufacturers which was to be held in Montreal on Monday, April 26th.

On the motion of Messrs. Farrell and Sturgeon the usual gratuity of $5 to the caretaker was approved.

The last business of the convention was the election of officers. Prior to this, the majority of those who had been present left the convention. As a result the old officers expressed unwillingness to stand again, but finally consented to return for two months and complete outstanding business, after which another convention will probably be called.

Messrs. Farrell, Gies, Sturgeon, and Ferguson were appointed a nominating committee. They reported in favor of the re-election of the old directors, with the addition of Mr. H. Farthing of Toronto, as treasurer, in place of Mr G. Clapperton, who was made an honorary director.

President Hicks, however, expressed a wish to resign. He hoped for the appointment of a more capable man for the present year, and said he did not consider that the society had made proper progress under his presidency, although he did not think it wholly his fault or that of the directorate. Mr. Clapperton then occupied the chair the president had vacated pending a new appointment.

The nominating committee then suggested Mr. E. H. Russell as President and Mr. G. Cooper as vice president

Mr Russell however, declined the presidency emphatically on the grounds that president and secretary must needs be in the same city. He suggested however that he would be glad to act as vice president under Mr. Cooper.

Messrs. Ferguson and A. H. Reid moved the adoption of this report of the nominating committee.

Mr. Cooper then expressed his disappointment at having been absent for most of the present convention, the first in fourteen years that he had missed any part of. He declined the presidency on the ground that Toronto had had the chief officers too long and suggested that London representatives should be elected this year.

In a whimsical style all his own Mr. Cooper continued, "The idea of nominating an old rag like me. I'm dead and gone long ago, and there are lots of young fellows ready for the post and able to get out and hustle.

Mr. Farthing then declined the treasurership.

Mr. LeGrow then rose to his feet and said that as the officials had not had support from outside Toronto, the whole responsibility this year should be saddled on out of town members.

Mr. Russell said that he felt that Mr. Mansell and other Toronto members had put a tremendous amount of time and much money into the society. He pointed out that everything was in an unprecedented state just now. Everything seemed unsettled. In the London office, he said, finances were better than they had been for sixteen years, yet recently it had been difficult to arouse sufficient interest even to get a quorum. He, however, felt sure that interest was already re-awakening and now was the time to make a big forward move. "My impression," said he, "is that now is the time to organize, for people in difficulties will always try to struggle out. I think we should look for a largely increased membership in the near future." It was due to the members who had done so much for the society, that a concerted effort should be made to improve the association. Everyone, Mr. Russell held, who belonged, had derived much benefit from the society.

Mr. Maxwell said that it would take two months to clear up the business arising from the convention, and in that time, the society would know where it stood. He urged the old officers to remain in power, saying that if they couldn't put the organization on its feet again, no one could.

Mr. LeGrow agreed with Mr. Maxwell. "If the members are not sufficiently interested," he said, "We must let the association go. It is however, our duty to clean up outstanding business first, and then see."

From the chair, Mr. G. Clapperton urged the same thing.

It was then suggested that the officers should call another convention after the business was cleaned up, say in two months.

Mr. LeGrow stated that in his opinion, another convention was unnecessary. The members seemed to have lost interest.

Mr. Clapperton referred to the want of interest displayed during the convention as 'most disappointing.'

Mr. Hicks said that Mr. LeGrow was as keenly interested in the association as any. His bark was much worse than his bite. "The only thing I can see to do," he said, "is for us old officers to go back for two months."

A motion to that effect was immediately put by Messrs. Maxwell and Reid and carried unanimously.

The convention then adjourned at 6.50 p.m., on the motion of Mr. F. Maxwell.

SATURDAY, MORNING APRIL 24th.

On Saturday, April 24th, 1915, at 9.00 a.m., the members assembled at 22 College St. and were entertained by the Toronto members to an automobile ride, through the residential district of the city including the new Lieut.-Governor's residence in Rosedale and Col. Pellatt's castle "Casa Loma" on Wells Hill. The ride ended at the plant of the Dominion Radiator Company, Limited, where the members were welcomed by Mr. Peter McMichael, general manager and the staff of the Dominion Radiator Company. After all partaking of the abundant supply of General Manager McMichael's imported Havanas, the party were conducted through the plant by the staff of the Dominion Radiator Co. The numerous proceedings necessary in the manufacture of boilers and radiators were demonstrated and explained to all, including the privilege of seeing the boilers and radiators under actual test before leaving the plant. Mogul hot water boilers, the boiler with sufficient capacity to handle its rating including heater and piping system were given considerable attention by all present. The new tubular boiler was demonstrated in actual use, and certainly showed its ability to take care of all its maker's claim for it.

The party were then photographed in a group and also in the automobiles in which the drive had been taken, these being owned by members of the Toronto Committee, after which the assembled party gave three cheers and a tiger for The Dominion Radiator Company, Limited, its officers and staff, for the pleasant and interesting manner in which they had entertained the members of the Society on this occasion. The members then departed for their many destinations after one of the most important conventions of the Ontario Society of Domestic, Sanitary and Heating Engineers.

A RED CROSS APPEAL TO SANITARY ENGINEERS.

Our country, with its Allies, is waging a great war for justice, for the protection of small nations in the enjoyment of their rights, for continued and growing freedom, and for the maintenance of its pledged word of honor. Much destruction and desolation are being caused. Lives are being lost by the thousand. Canada's sons are now in the thick of it. Some will fall sick; many may be wounded; some will pay the last full measure of devotion to their country and its cause.

The Red Cross Society exists to succor the sick and wounded in war. The need of Red Cross Service is great and growing greater as the war goes on. The price of progress towards lasting peace is very, very dear. It costs lives, homes, health and much besides. Canada's part in the process of payment, through giving for Red Cross work, is mercifully light and easy, even when all have given to the extent of really feeling it.

The soldiers and sailors pay the price exacted by the desolating struggle from week to week. What they paid in blood and did in sacrifice a month ago was not enough for them. Shall we say it was enough for us? What they are doing and suffering and achieving has put aside, for the time, all their thoughts and plans for individual welfare, comfort and safety, for our principles and ideals that they may be upheld.

Sanitary engineers are generous in sentiment and generous in giving when their hearts and heads point the way. This is a case when they do so point clearly, persuasively and urgently. In this crisis, in the lives of nations and in the lives of stricken soldiers, none can pray too much, do too much or give too much.

I appeal to sanitary engineers to send me sums from $1 to $50, during the first week in May. Every $50 provides one additional hospital bed with the giver's name over it. By sending me about $10,000, you would serve your country well, bring credit to yourselves, and make all of us very proud of you. For the sake of the wounded boys, make the gift substantial. It will be an investment towards the recovery of some Canadian soldier who stood in our stead that our cause might be upheld.

Faithfully your friend,
JAS. W. ROBERTSON,
Chairman,
Red Cross Society at Ottawa.

PRESENTATION AT FORT WILLIAM

ON the evening of the 15th inst., the sanitary engineers of Fort Williams honored one of the best of old scouts, Sergt.-Major E. D. Higginbottom, on his volunteering for active service at the front and presented him with a handsome case of gold mounted pipes. They also decorated him with a cross of honor specially manufactured for the occasion by Mr. Wm. Allen. The said cross is made in parts and inlaid with the following metals—gold, silver, copper, aluminum, tin, lead and brass.

At the smoker which was given in conjunction with the presentation a most enjoyable time was spent right on into the "wee sma' hours o' the morning." The presentation was made by our old friend and pioneer, Alex. Cameron, who made some very appropriate remarks as to friend Higginbottom's patriotism in giving up home and family and arranging for the carrying on of his business, which we understand, is one of the most prosperous in the city. But, as is well known an old war horse cannot stand still when it hears the blare of a trumpet, or the rattle of a snare drum, so likewise E. D. H., who is an old South African veteran; the country calls, and like a man and a soldier ,he is ready and willing to give up his all, even to his life if it comes to a show down.

D. F. Anderson, an another old timer, made the presentation of the cross—he was rather humorous in some of his remarks, and hoped that the recipient would not replace its honored position on his noble chest, unless it was with the V.C., or D.S.O.

Mr. Higginbottom in replying, gave a humorous resume of his past and present military duties, and stated that amongst even the most raw recruits, he would find old soldiers of the British regulars even up to 14 years active service both at home and abroad, and some with a bar of ribbons that would make a major-general envious.

Other speeches were made appropriate to the occasion from Messrs. Sime, Marshall, Brayley, Milne, McRae and Macnamara—but one of the best items on the program was when "Bill" Allen fetched the old gee-gee home in a canter he got everything going so good that even the table maids were wanting to get into the race with the pony and went "galloping" around the room. Another hit of the evening was when "Bill" Brayley gave a rendering of his famous "opera" "Silver Threads Amongst the Gold."

A. D. Smith gave a reading "Bravo," that marks time to the exigencies of the times, "when the country wants every man who can shoulder a gun and to hell with the men who play." A. Gough after the toast "Our Flag," sang "We'll Never Let the Old Flag Fall," and the chorus was so rousing one expected to see the roof fall in. There is no need to say that each and every toast was drank in bumpers to a chorus. Professor C. H. Cleworth, Mus. Bac., presided at the piano, and rendered several patriotic selections. The chair was filled by Inspector Macnamara, who made everything go as merrily as a marriage bell to the merry jingle of glasses. All credit must be given to D. F. Anderson, who manufactured and presented each guest present with a cross and ribbon containing a photo of Sergt.-Major Higginbottom, which will be prized as a souvenir of the night. Laurie Green must not be overlooked as the mainspring in engineering the events.

List of those present and contributors: —Anderson, Arthur, Allen, Brayley, Cameron Sr., Cameron Jr., A. Cunningham, W. Cunningham, D. Lee, Gough, Green, Hunter, Knibbs, Milne, Macnamara, Millar, Marshall, McRae, Silk, W. B. Sime, J. Sime. Among the guests were Mr. A. Black, proprietor, G. Black, Prof. Cleworth, A. D. Smith, E. Doyle and Timmy.

The one cloud of the evening was caused by the absence of our "old reliable" J. J. Cullerton, who unfortunately was laid up with pneumonia, although absent in body, he, no doubt, was present in spirit. We understand he is recovering nicely.

PLEASED WITH SANITARY ENGINEER.

Editor Sanitary Engineer:

I was very much pleased, indeed, with the last number of The Sanitary Engineer.

The articles therein are very good, and the "get up" of the whole paper is high class.

The motive underlying all the contents is quite prominent and outstanding, namely, "to place the plumber and steamfitter on a higher plane," and the trade should appreciate your efforts by their increased patronage.

Kindly send me two additional copies of above issue, and enclosed please find my cheque covering my advertisement, which already has brought me results.

Sincerely yours,

JAMES J. MARTINDALE,

Canadian Manager of the United Electric Co., Toronto.

NEW BRUNSWICK NOTES.

Messrs. Evans & Chisholm, of New Glasgow, have just completed the steam heating in the Mitchel Building of eight storeys in that city. It is said to be the highest building in the Maritime Provinces.

Frank Dexter & Co., sanitary and heating engineers, Truro, have secured the contract for the sanitary and heating engineering to be installed in the new Presbyterian church.

They have just completed two contracts of a like nature, one in the Agricultural College, and the other in the new T. R. C. depot recently erected in Truro. The latter is the largest and finest of its kind, with the exception of perhaps two or three in Canada.

Mr. Dexter will be one of many prominent sanitary and heating engineers who will be present at the coming national convention to be held in St. John's, June 22, 23 and 24.

Messrs. Stanley Shaw & Riordon, Charlottetown, are now busy completing the sanitary engineering in the new Dalton Sanitarium. James McEachern succeeded in getting the heating installation.

The money with which this institution was built was donated by the Hon. G. Dalton, and is the first building of its kind in Prince Edward Island.

Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WHAT SIZE OF BOILER.

Editor Sanitary Engineer:

I would like to ask your opinion about the size of boiler you would recommend for, say, 1,000 sq. feet of steam radiation: that is, suppose a building required 1,000 sq. feet of radiation, would you recommend a boiler of sufficient size to take care of 1,200 feet or so? Further, if I were to install an extra amount of radiation, what would be the result?

A. R. S.

As our inquirer does not state what method of steam heating he refers to, we presume that he means low pressure. We would advise a boiler of at least one-half more capacity over and above the mains, that is, if a system has 1,000 sq. feet of heating surface including mains, we would recommend a boiler capable of handling 1,500 sq. feet including mains, and the mains should be covered at that.

Regarding the extra amount of radiation, we would state that a building requiring, say, 1,000 sq. feet of radiation, if another 25 per cent. were added, providing the furnace is 50 per cent. larger, that 1,250 sq. feet capacity would result in an economy in fuel. If heating engineers would raise the percentage of radiation, then the radiation installed would not require to be as hot. Fires could be burned slowly, thus allowing proper combustion of fuel. If a fire is burned slow and the chimney is right, there will be less heat go up the chimney. When a fire has to be forced, anywhere from 60 to 90 per cent. of the heat units are going up the chimney, and much steam has to be raised to an excessive height, to enable every radiator in a building to give off sufficient heat, there are two things wrong. First, either the boiler is too small, or second, there is not sufficient radiation installed. Large capacity boilers and lots of radiation are the best economizers of fuel, providing the pipe lines are well laid out, and either the radiators or system is efficiently vented.—Editor.

* * *

HEATING SURFACE OF MAINS.

Editor Sanitary Engineer,—You have often mentioned in your paper that all heating mains should be covered. Will you inform me in an early issue how to determine the heating surface of mains so as too add it to the radiation when choosing the size of a boiler. Some simple way would suit me fine.—A. S. S., Manitoba.

The easiest way to arrive at the heating surface of mains, both flow and returns would be to measure the lineal feet of each size of pipe and divide the number of feet by 3. As an example, 60 ft. of 1 inch pipe would be equal to 20 feet of radiation, 60 feet of 2 inch pipe would be equal to twice the amount, viz., 40 sq. feet, 60 feet of 1½ inch pipe would be equal to 30 sq. feet of radiation, and so on. Divide the length by 3, and multiply results by the size of pipe.—Editor.

* * *

DO YOU GET YOUR PAPER?

It has come to our notice that some of our subscribers do not get their copy of The Sanitary Engineer regularly. The editor would esteem it a favor if any who do not get their paper regularly would drop him a line.

We do not wish any one to miss a copy, and if at any time a reader desires to procure an additional copy of any issue to hand over to a member of the craft we will be only too pleased to forward a copy free upon application providing we have one in stock. Any news items of general interest to the trade will be gladly received.

THE MYSTERY OF THE INJECTOR.

Editor Sanitary Engineer, — Some time ago you were asked how a steam pump could force water back into a boiler against the same pressure as was used in working the steam end of the pump. I was very much interested and enlightened by the answer you gave.

Could you inform me in a future issue of The Sanitary Engineer how a steam injector works? It has like that of the steam pump, been somewhat of a mystery to me.

STEAMFITTER.

The following article by W. Stratford, which appeared in the April issue of Power House, fully explains the working of the steam injector:

The injector for feeding the steam boiler is one of the most beautiful and interesting pieces of mechanism among all known applications of the genius of man to the utilization of scientific principles. Its wonderful simplicity of construction and its effectiveness when properly proportioned and well made, command the admiration of every intelligent person, as well as the engineer and the man of science. At first glance, however, its action seems to contradict the teachings of both science and common sense.

The instrument which is now in general use on locomotives, traction engines, small boilers and frequently elsewhere, consists simply of a slender central tube through which steam passes from the boiler, emerging at its inner end within another tube, concentric with the first, and which latter tube conducts a current of water from a supply pipe into the body of the instrument. Opposite the mouth of this second pipe, but detached from it is a third tube, open at the end, facing the water supply tube and leading from the instrument to the boil-

EMPIRE

Nickel-plated Automatic Seat-operating Royal Flush Valve

with adjustable bar hinge and open back and front seat. Vitreous china syphon jet bowl.

A perfect outfit for school, factory or any public toilet. We guarantee our flush valves under all conditions when properly installed and we have a full range of combinations sufficient to allow of a selection for any service or building.

EMPIRE

Vitreous China Low-down Tank with Centre Push or Top Side-lever Action

Open back and front seat and vitreous china syphon jet bowl.

The vitreous china low-down tank makes the ideal tank for the private residence. It matches in color the rest of the bathroom fixtures, and is easily kept clean and sanitary.

We make a large range of tank combinations of every description and in any wood, and if required are prepared to match perfectly the woodwork of any room if a sample is supplied us.

Write for particulars.

Empire Manufacturing Company, Limited

LONDON, CANADA

Manufacturers of and Dealers in Plumbers' and Steamfitters' Supplies of All Kinds

er feed pipe. The steam and water supply tubes are fitted with stop valves, and the discharge pipe with a check valve.

If ever there was an example of perpetual motion this would seem to be it. In the earlier forms of injector, openings were made in its sides through which could be seen the jet of mingled steam and water in its passage across the open space between the two nozzles, looking like a solid rod of glass, and frequently leading the observer to suppose that the steam was carried in a glass tube. The loud hissing noise and the readiness with which a pen-knife could be used to interrupt the current and send it flying out of the sight holes, promptly dispelled the error however.

The mechanical principles upon which the action of this instrument is based, mysterious as they appear to the casual observer, are very simple. They have frequently been referred to in the columns of engineering journals and doubtless many readers of The Power House are familiar with them.

If an opening were made in the steam space of the boiler, the steam would rush from it with a velocity which would be just sufficient, could its direction be reversed without loss of motion, to carry it back into the boiler again. Could the whole force of the steam be concentrated upon a smaller area than that of the opening made from its egress, the resisting pressure which could be overcome by the stream might be correspondingly increased. The resisting pressure remaining the same, the stream might not only re-enter the boiler when thus condensed, but might carry with it a considerable additional weight. Steam leaving a boiler under a pressure of 60 lb. per square inch occupies when condensed a space of but 1-350th of its original magnitude and would concentrate its force upon a correspondingly decreased resisting area.

A pound of such steam occupying 5½ cubic feet condenses into 27½ cu. in. of water, and were it not retarded by friction it would have sufficient energy to take back into the boiler a weight of water more than sufficient to condense the steam. The velocity with which such steam flows into the atmosphere is about 1,500 ft. per second, and although it is undoubtedly greatly retarded in all cases by friction, the fact stated gives some idea of the immense velocity with which steam may flow. Most injectors on the market to-day are simply instruments in which these principles are usefully employed. The stream of steam from the boiler flowing through its central tube is condensed as it plunges into the current of water which surrounds the steam adjutage, and carries the whole forward with immense velocity, overcoming all frictional resistance, and re-enters the boiler with it. It thus acts as both feed pump and heater.

The amount of surplus energy obtained by thus concentrating the forces of the issuing streams, is very great, as is shown by experiments in which steam taken from one boiler has been made feed another boiler containing steam of nearly double the pressure.

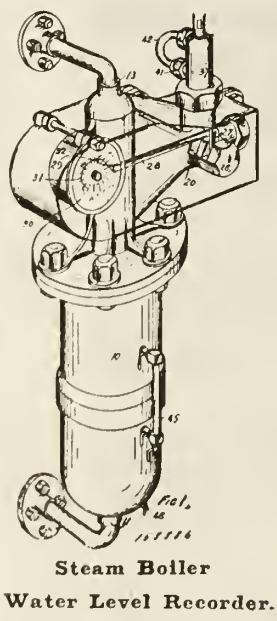
A moment's thought will make it evident that the water supplied to the instrument cannot be highly heated. It must be sufficiently cold to condense the steam without making the quantity of injection water so great as to overload the apparatus and thus prevent the stream from forcing its way into the boiler. When the feed water is to be heated to a temperature higher than 120 or 150 degrees Fahrenheit it should be done by carrying it through a worm of large heating surface after leaving the injector.

CANADIAN PATENTS.

No. 158,886.

George Alan More, Sydney, New South Wales, Australia, 10th November, 1914; 6 years. Filed 1st June, 1914. Receipt No. 239,500.

Claim.—1. Apparatus for the purposes described, comprising water and steam chambers in fluid connection with the water and steam spaces respectively of a steam boiler, a water borne float,



Steam Boiler Water Level Recorder.

a lever adapted to be raised and lowered by the vertical movements of the float, a cam-shaped boss on said lever, a steam valve, mechanism whereby the boss operates said steam valve to permit a supply of steam to escape to sound an alarm, an externally placed lever, mechanism to operate said lever from the first-mentioned lever, a rod pivotally attached to the externally placed lever, the free end of which carries a scribing point, and a movable surface with which said point is in rubbing contact.

2. Apparatus for the purposes specified, comprising water and steam chambers, a float, a lever suitably trunnioned and operated by said float, a steam valve, means whereby said lever is adapted to actuate said valve to supply steam to sound an alarm, an extension on the trunnion of said lever, an externally placed lever attached to said extension so as to be oscillated by the movement of the trunnion, a rod to which the second lever is pivotally connected, a scribing point carried by said rod, and a movable surface on which said point is adapted to trace a line or lines to record the variations of water level in a steam boiler, as and for the purpose described.

3. In apparatus for the purposes described, means for diagrammatically recording variations of levers of water in a steam boiler comprising a float, a lever suitably trunnioned and actuated by said float, an extension from the trunnion of such lever, comprising a valve provided with a chambered boss embracing one end of the trunnion and in sliding contact therewith, a compression spring confined within the chamber formed in the boss adapted to keep the steam valve closed, and an outwardly projecting extension on the steam valve, a lever secured to the extension of the steam valve, a rod pivotally secured to said lever, a scribing point carried by said rod, and a movable surface on which said point is adapted to trace a line or lines to record the variations of water level in a steam boiler, as and for the purpose described.

* * *

No. 157,588.—Faucet.

Carl W. Wank, Chicago, Illinois, U.S.A., 25th August, 1914; 6 years. Filed 19th February, 1914. Receipt No. 234,919.

Claim.—A faucet comprising a primary valve casing and a secondary valve casing, there being a valve seat in each of said casings, a primary valve in said primary casing co-operating with the valve seat in the latter, a cylindrical secondary valve in said secondary casing, there being a portion at one end of said secondary valve co-operating with the seat in said secondary casing, and supporting guides formed on the other end portion of said secondary valve, said guide being spaced at a substantial distance from the first mentioned end of said secondary valve, substantially as described.

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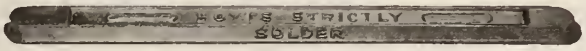

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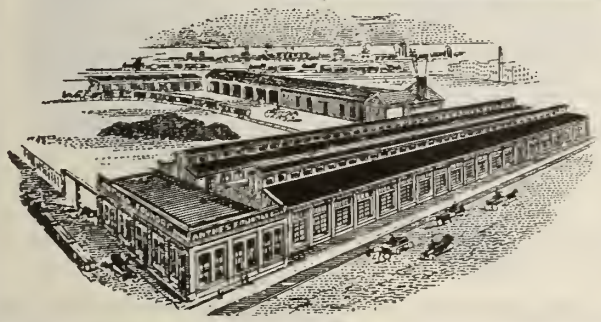

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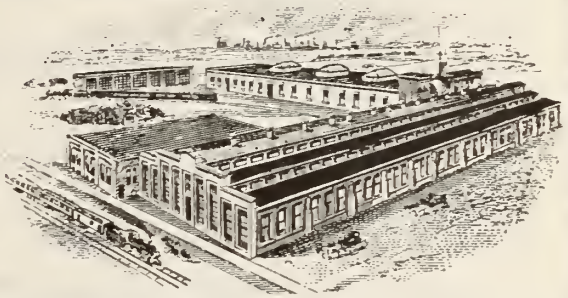

The man who does not advertise simply because his grandfather did not should wear knee breeches and a wig.

The man who does not advertise because it costs money should quit paying salary for the same reason.

The man who does not advertise because he doesn't know how to write an advertisement should quit eating because he can't cook.

The man who does not advertise because somebody said it did not pay, should not believe the world is round because the ancients said it was flat.

ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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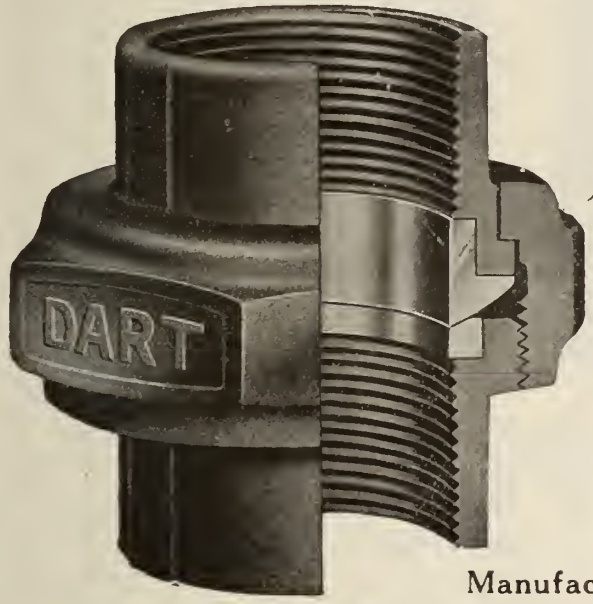

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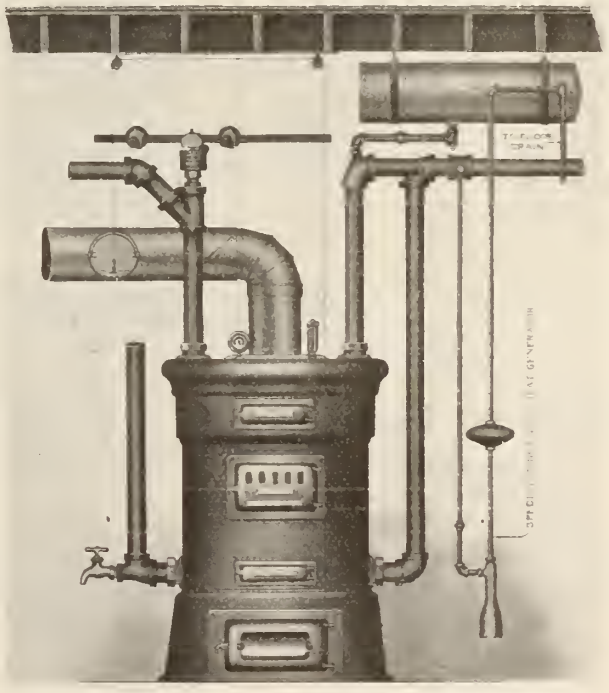

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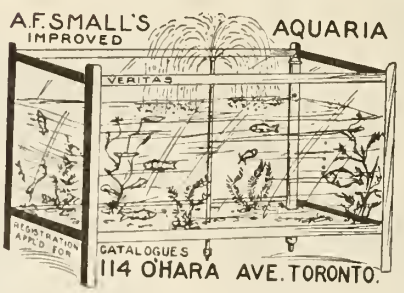

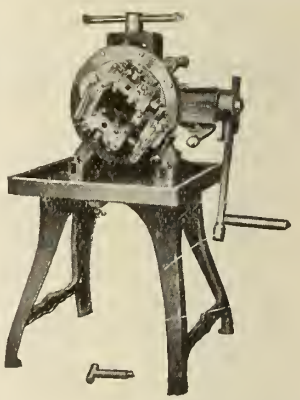

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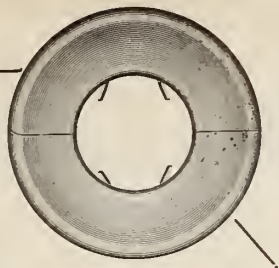

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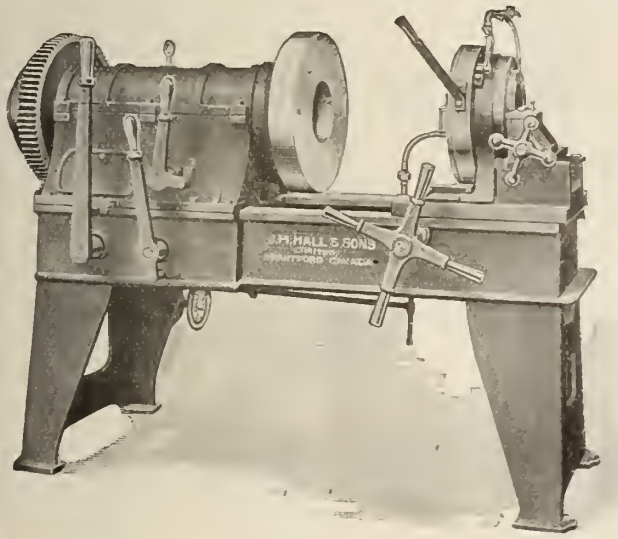

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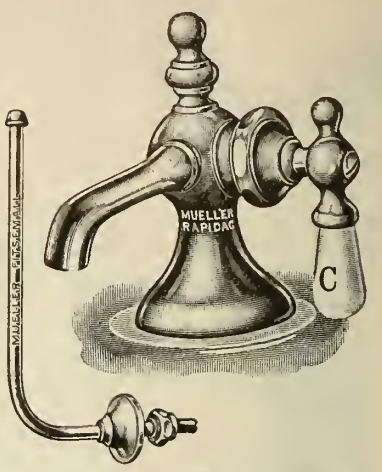

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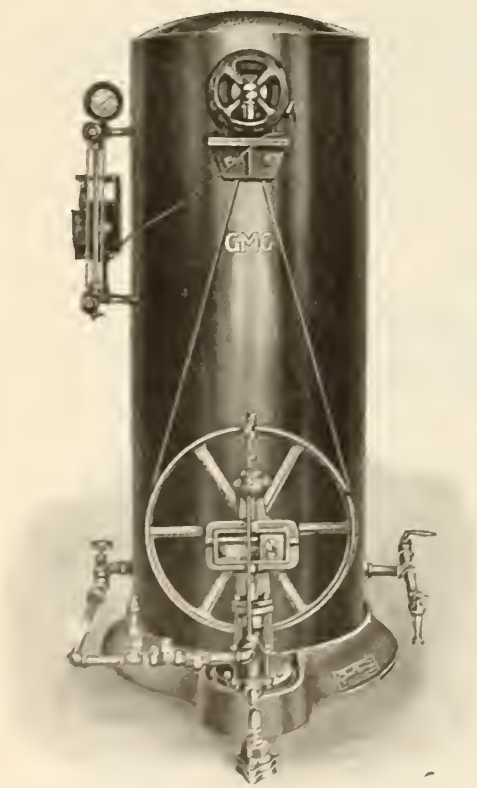

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H. L. Seymour.

Correspondence Schools.
Anglo-American Sanitary School.

Country Residence Equipments.
Empire Brass Mfg. Co., London.
General Machinery Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Limited, Toronto.
Jno. Stevens & Co., Ltd., Winnipeg.

Damper Regulators.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
Empire Brass Mfg. Co., London.
Fittings, Limited, Oshawa.
International Malleable Iron Co., Ltd., Guelph, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.
Penberthy Injector Co., Ltd., Windsor, Ont.

Ejectors for Sewage.
National Equipment Co., Ltd., Toronto.

Enamelware.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Electric Pumping Machinery.
Ashdown Hardware Co., Ltd., Winnipeg.
Empire Brass Mfg. Co., London.
General Machinery Co., Ltd., Toronto.
National Equipment Co., Ltd., Toronto.
Jno. Stevens & Co., Ltd., Winnipeg.

Fittings.
Empire Brass Mfg. Co., London.
International Malleable Iron Co., Guelph.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., London.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
Canadian Wolverine Co., Ltd., Chatham.
Gurney Foundry Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Garbage Burners.
Gurney Foundry Co., Ltd., Toronto.

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National Equipment Co., Ltd., Toronto.

Gas Water Heaters.
Gurney Foundry Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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P. Campbell & Co., St. John, N.B.

Generators.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Gurney Foundry Co., Ltd., Toronto.
Harris Construction Co., Ltd., Montreal.
E. S. Manny Co., Montreal.
Steel & Radiation, Ltd., Toronto.
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Lead.
Empire Brass Mfg. Co., London.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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P. Campbell & Co., St. John, N.B.

Mixing Valves.
Geo. Carpenter, Montreal.
Standard Sanitary Mfg. Co., Toronto.

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Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
Warden King, Ltd., Montreal.

Oil Storage Systems.
General Machinery Co., Toronto.
National Equipment Co., Ltd., Toronto.

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Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.

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Canadian Tube & Iron Co., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

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Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
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Can. H. W. Johns-Manville Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

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Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

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Cluff Bros., Church St., Toronto.
C. A. Dunham Co., Ltd., Toronto.
General Machinery Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
John Stevens & Co., Ltd., Winnipeg.

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Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn.

Radiator Traps (Steam.)
C. A. Dunham Co., Ltd., Toronto.

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C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.

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Hoyt Metal Co., Toronto.

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Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Lady Engineering Co., Alpena, Mich.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
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The E. S. Manny Co., Montreal.
Penberthy Injector Co., Ltd., Windsor, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
C. A. Dunham Co., Ltd., Toronto
Harris Construction Co., Ltd., Montreal.
E. S. Manny Co., Montreal.

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James Morrison Brass Mfg. Co., Toronto.

Testing Plugs.
C. M. Kemp Mfg. Co., Baltimore.
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Armstrong Mfg. Co., Bridgeport, Conn.
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Dart Union Co., Ltd., Toronto.

Vapor Heating Systems.
C. A. Dunham Co., Ltd., Toronto.

Vitro Tanks.
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Ashdown Hardware Co., Ltd., Winnipeg.
Empire Brass Mfg. Co., London.
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John Stevens & Co., Ltd., Winnipeg.

PENBERTHY TRADE MARK

COMPODISK
BRASS VALVES

"With the Composition Disc"

PENBERTHY TRADE MARK

Would You Like to See
The Finest Valve on the Market?
Specify This Valve the Next Time

GLOBE

ANGLE

It has the external thread construction, i.e., the threads on the bonnet end of body are on the outside of valve, immune from corrosion, action of water, steam, etc. This construction is much stronger than valves having the bonnet screwed into the body. It means no straining or stripping of threads when assembling or taking apart. Impossible to spread or enlarge body of valve, causing a loose-fitting and unsafe bonnet.

STEAMFITTERS

should specify our valves and save time, money and trouble.

The full line is approved for steam pressures as high as 175 lbs. by Public Works Department of Ontario and Western Provinces.

SWING

HORIZONTAL

This Line of Valves is Stocked by all Leading Plumbing Jobbers in Canada. Don't take any Substitutes.

Manufactured by

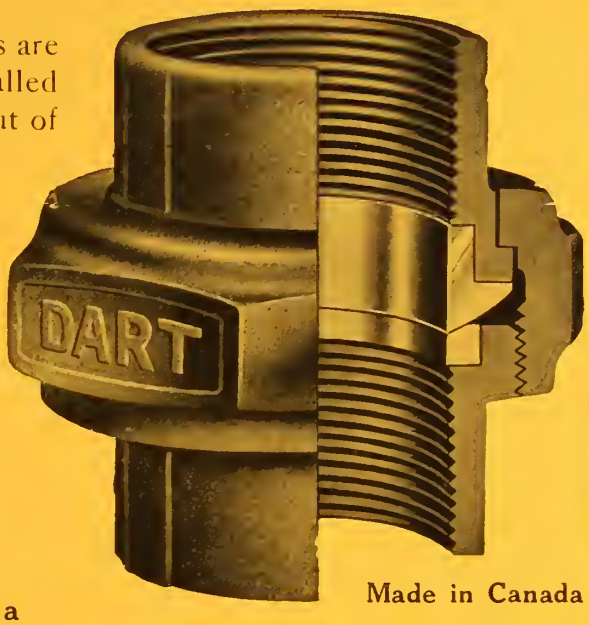
Penberthy Injector Co., Limited Windsor, Ont.

DART UNIONS MEAN SURE-SATISFACTION

BRONZE to BRONZE
AT THE JOINT

These pipe couplings are easily and quickly installed whether pipes are in or out of line, and they stay tight because there is no deterioration at the joint and the heavy iron parts will not stretch or pull apart.

Dart service and the resultant satisfaction is a prestige builder that will prove invaluable to your business.



Sold by jobbers throughout Canada.

Dart Union Company, Limited, Toronto, Canada

Made in Canada

KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

This plant is at your service.
Help us keep it busy.

REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

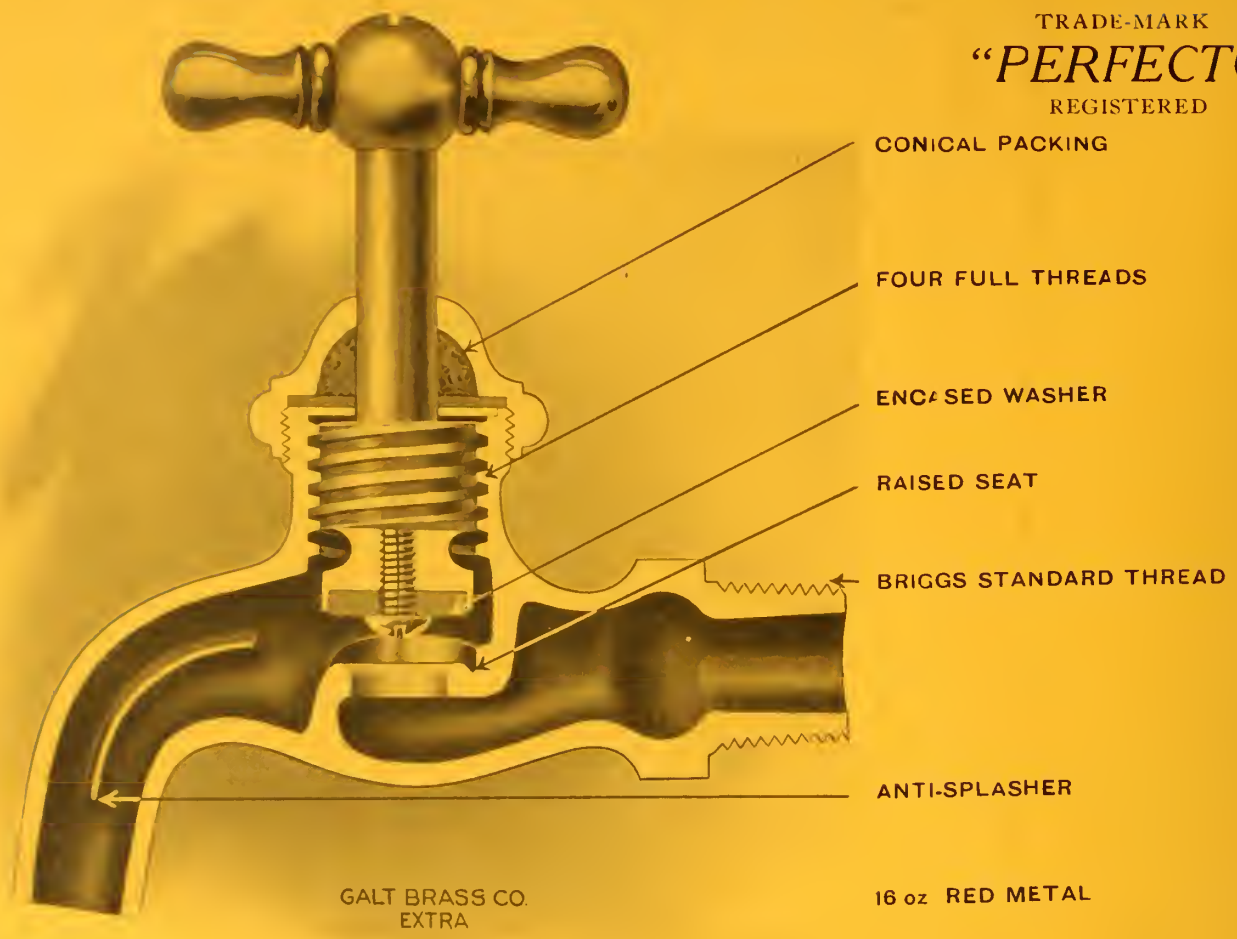
Quickest possible deliveries.
Consistent Prices.

Best quality of goods.
Write for Catalog No. 5.

The Kerr Engine Company, Limited
Walkerville, Ontario

Valves and Hydrants Exclusively

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX | Publication Office : TORONTO, MAY 15, 1915 | No. 10

SINK SERVICE

The F301 or F302 ONE-PIECE Sink and Drain-board Combination is the type of Sink most generally in demand for high class and semi-high class jobs, because it combines all the qualifications essential to PERFECT SINK SERVICE.

It is a big, massive, high-grade fixture, with Sink, Drain-board, Back and Apron all CAST IN ONE PIECE, in which all unsanitary cracks and crevices have been eliminated.

PLATE F301

Made with R. H. Sink and L. H. Dr. Bd. or L. H. Sink and R. H. Dr. Bd.

PLATE F302

Same as F301 except with INTEGRAL END PIECE for R. or L. Hand Corner Sink.

NOTE.—New Style Adjustable Legs, which provide an adjustment of 29½ inches to 33 inches from floor to top of rim, are now regularly furnished. Larger Leg can be supplied to permit adjustment of sink 33 inches to 36 inches from floor to top of rim.

The Standard Ideal Company Limited

General Offices and Factories: Port Hope, Canada

TORONTO	MONTREAL	WINNIPEG	VANCOUVER
119 King St. East	42 Beaver Hall Hill	80 Lombard St.	410 Carter Cotton Bldg.

Beaver Brand
Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

Amherst Foundry Co., Limited

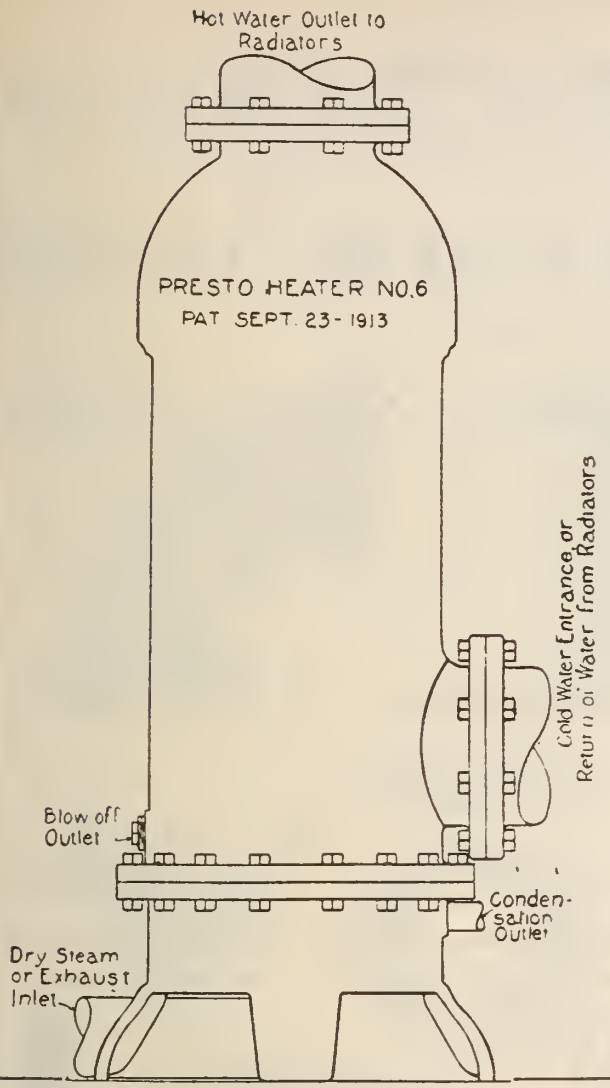
General Offices and Factory: Amherst, Nova Scotia

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co.,
71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes,
120 Lombard St., Winnipeg

BRITISH COLUMBIA:
A. O. Campbell,
864 Cambie St., Vancouver


Hot Water Outlet to Radiators
PRESTO HEATER NO.6
PAT SEPT. 23-1913
Cold Water Entrance, or Return of Water from Radiators
Blow off Outlet
Conden-sation Outlet
Dry Steam or Exhaust Inlet

Twice as Many
PRESTO HEATERS

were sold and installed during the last two years than all other kinds and makes combined.

The reason is simple—AMONG THOSE USING THE PRESTO HEATER THERE ARE NOT ANY WHO HAVE NOT EXPERIENCED A SAVING OF AT LEAST 25%, AS COMPARED WITH OTHER HEATERS PREVIOUSLY USED.

WE REPEAT OUR CHALLENGE

We will deposit $500.00, to be presented to any charitable institution, if any manufacturer of a heater can disprove the statement that The Presto Heater will effect an economy of 25% in comparison with any other heater on the market. Further, we will pay all costs of the test and will publish the result in these columns.

This challenge is made as a protection to ourselves. Other manufacturers have made statements unfavorable to our heater. Let them come forward. If they decline to put our heater to the test, beside their own, the reason will be self-evident.

HARRIS CONSTRUCTION CO., LIMITED
120 Sanguinet Street, MONTREAL

B-O-T WATER CLOSETS

ARE

GUARANTEED FOR FIVE YEARS

with no extra cost.

We Are Water Closet Specialists

and devote all our time to making the one line perfect.

Our new Catalogues are just out; if you have not received one, write us.

The B-O-T Mfg. Company, Limited

B-O-T BUILDING

159-161 Richmond St. West, TORONTO

Montreal: Thos. Robertson & Co.

Vancouver: The Robertson-Godson Co.

Edmonton: Carroll-Wilson Co., Ltd.

Winnipeg: J. H. Leonard 405 Tribune Building

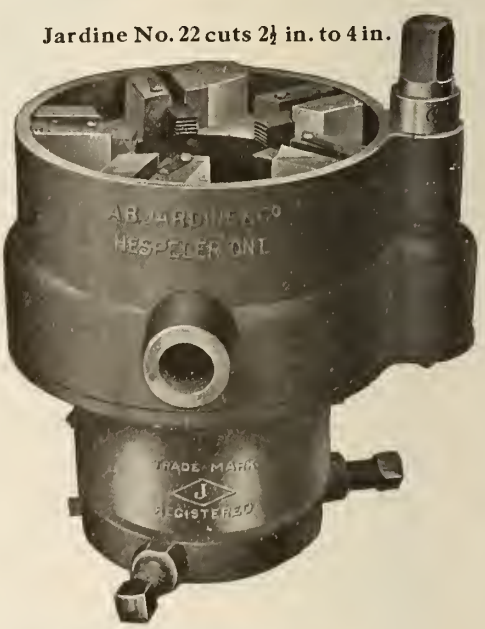
"Jardine" and "Toledo"

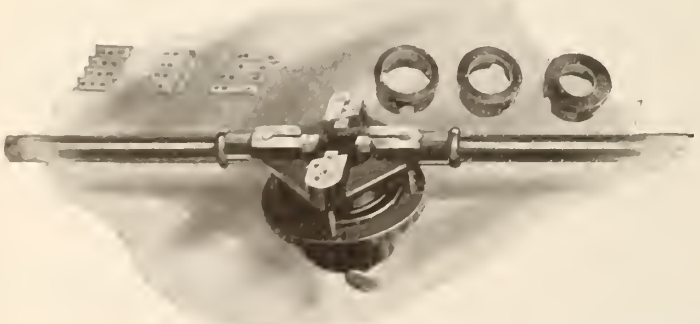
PIPE THREADING TOOLS

Made in Canada

Do the very best work.
Do it in less time.
Cost you less for repairs.
They are the tools to buy.

Jardine No. 22 cuts 2½ in. to 4 in.





Toledo No. 1 cuts 1 in. to 2 in.

Ask for our new Pipe Die Catalogue.

A. B. JARDINE & CO.

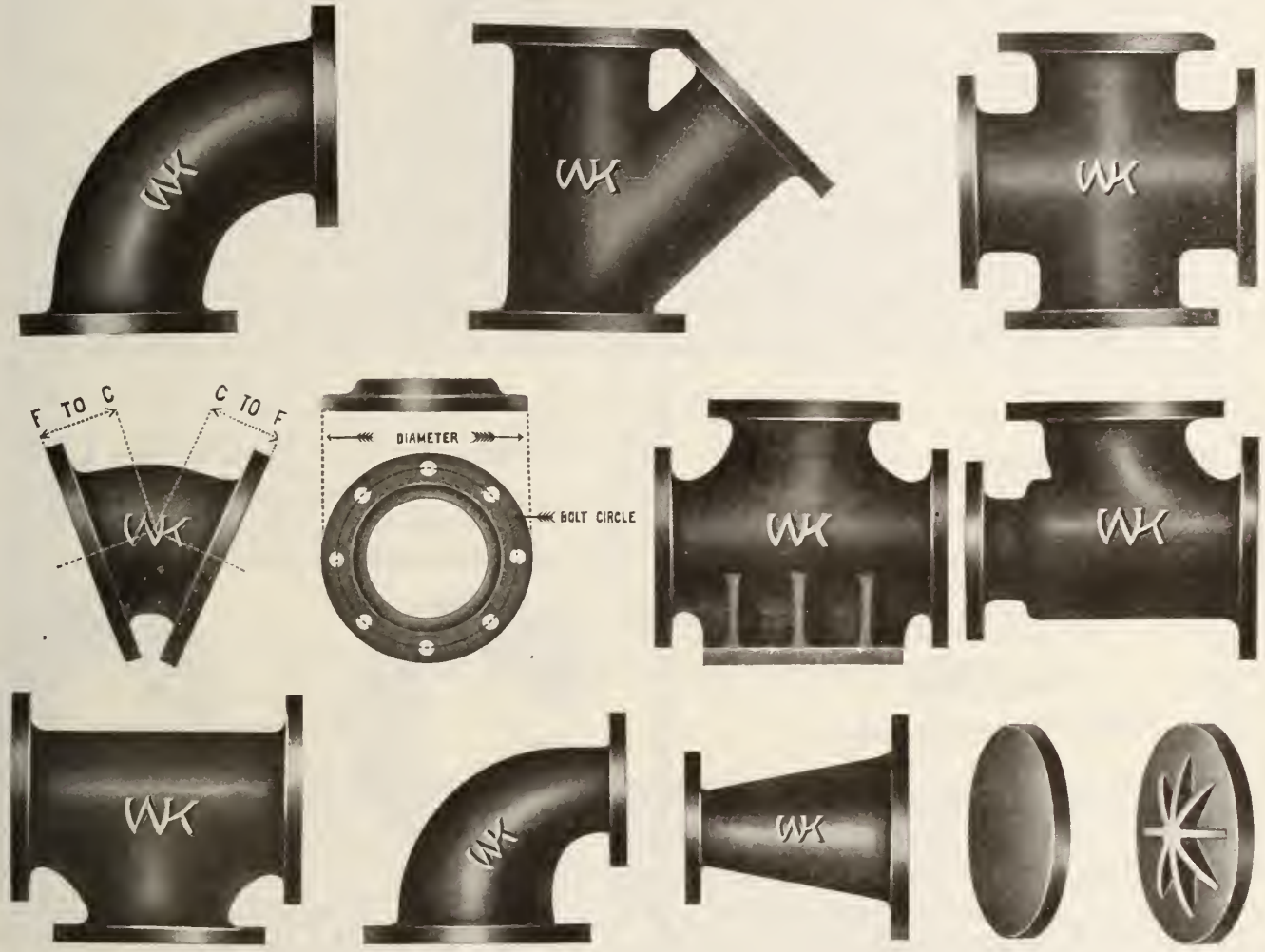
Hespeler, Ontario

Sole Makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.

Agents, Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man
Brockville and East—J. R. Devereux, 142 St. Joseph Boulevard West Montreal, Que.

FLANGED FITTINGS

Made In Canada



We manufacture and carry in stock a complete line of flanged fittings, both standard and extra heavy.

Also screwed steam fittings.

WARDEN KING, LIMITED

Montreal

BRANCH:
200 Adelaide St. West, Toronto

CITY SALES OFFICE:
151 Craig St. West, Montreal

Stop This Waste

The money now **wasted** by **inefficient** files would pay Canada's whole file-bill —if files were used **right.**

The **right** way is to use a file **only** to the point where **efficiency decreases.** Beyond that point, it is **inefficient.** It **wastes time.** Enough to pay for **several** new files—and leave a margin of profit beside.

To stop **file-waste** on YOUR work—enforce the rule against **inefficient** files. See that your men **promptly** replace all worn files—and use only the "Famous Five":

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(Made in Canada)

Their **efficiency** reflects our **50 years'** experience. Their **uniformity** reflects our **complete control** of every manufacturing process. Their **economy** reflects the saving of our **60,000,000** yearly output. Their **popularity** reflects the QUALITY that holds **90%** of Canada's file demand.

Stop file-waste. **Turn losses into profits. Use only the "Famous Five." Catalog and "File Philosophy" FREE** on request.

NICHOLSON FILE CO.

Port Hope, *Dealers Everywhere* Ontario

SOMETHING NEW

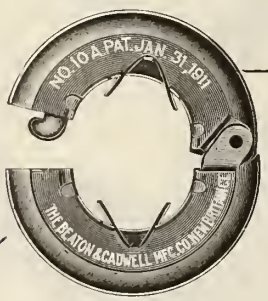
THE GEYSER AUTOMATIC WATER HEATER

is composed of a vertical cylinder from four to six feet long, according to size. The cylinder contains brass pipes which receive the steam and transmit heat to the water. These pipes are screwed to the base chamber, but remain independent from one another at the top, consequently the expansion is entirely free, and leaks are impossible.

FULLY GUARANTEED
MANUFACTURED BY

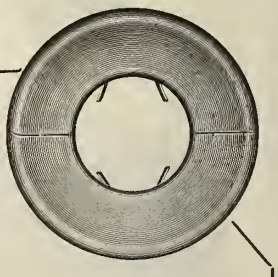
THE E. S. MANNY CO.
MONTREAL

R. E. Cleaton Co., 20 St. Nicholas Street, Montreal
Sales Agents



OPEN VIEW NO. 10-A.

The CEILING PLATE that's better



TOP VIEW NO. 10-A.

THE NO. 10—A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ¾" WIDE. HIGHLY FINISHED. ESPECIALLY DESIGNED FOR IRON CONNECTION.

The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and users at the very last, and is not exposed during completion of a building.

High quality at the right price.

GEM NO. 4.

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

Write for catalog showing our complete line of specialties.

The BEATON & CADWELL MANUFACTURING Co.

New Britain, Conn.

Eastern Agent: J. R. Devereux, 233 St. James St., Montreal.
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DIEU ET MON DROIT
OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND
ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN
SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND
Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity
"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.
Standard Sanitary Mfg. Co.
Limited
General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario
TORONTO STORE
55-59 Richmond Street, West
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BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND
THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME
BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON
PALACE OF THE KING OF THE BELGIANS
BRUSSELS

Wolverine Tank Balls

—Guaranteed—

The ball with the reinforced top which makes elongation impossible.

Made of the finest rubber and will outwear three ordinary tank balls.

Our full line of Quality Rubber Goods are at your command, and if you want to give satisfaction all the time, use only Wolverine goods.

Canadian Wolverine Company
Limited
CHATHAM, ONT.

Jenkins Bros.' Brass Valves

represent a distinct type of valve in which the usual solid metal clapper is replaced by a brass or other suitable metal disc holder containing a renewable Jenkins Bros. Disc of a softer flexible composition which adapts itself to any slight inequalities of the seat.

No regrinding is necessary. When the disc is worn after long service it can easily be replaced by any one at slight expense, rendering the valve as tight as when new. The complete valves do not wear out.

Particular attention is called to the fact that these valves are fitted with **Manganese Bronze Spindles.** This metal is 60 to 70% stronger than regular bronze, is much harder and offers maximum resistance to wear.

A distinct feature is the metal gland or follower, as shown in stuffing-box, in sectional view. This gland compresses the moulded asbestos packing ring in the stuffing-box, making a perfectly tight joint.

Unless otherwise specified all Jenkins Bros.' Standard Pattern Globe, Angle and Cross Valves will be furnished with Jenkins Bros.' No. 119 Disc—the new composition for steam service.

Jenkins Bros.' Standard Pattern Brass Valves are made from ⅛" to 3" in size in globe, angle, cross, hose, Y, horizontal and swing check patterns.

Approved for use by the Depts. of Public Works in Ontario and the Western Provinces.

CATALOG MAILED—FREE.

JENKINS BROS., Limited
103 ST. REMI STREET MONTREAL

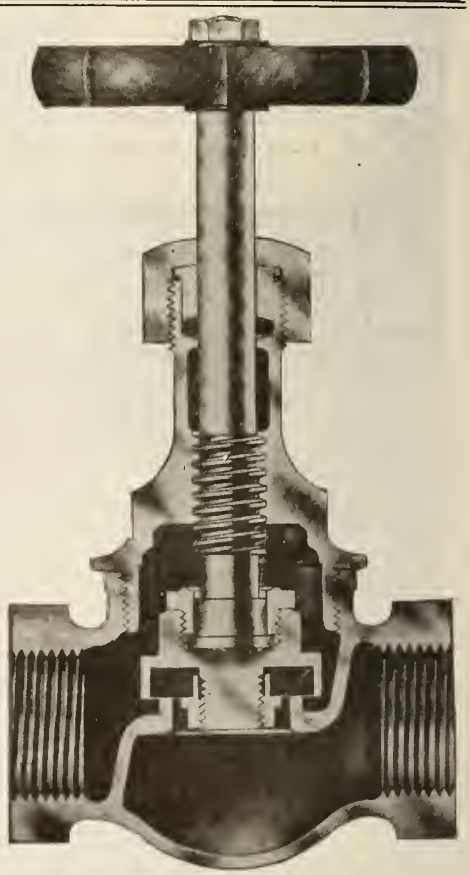


Fig. 106—Brass Globe Valve, Screwed (Sectional View)

VITRO

NO TROUBLE TANKS

No joints to open up, nor linings to leak, and when installed will outlast that of any other closet tank made

The design and finish present a very attractive appearance.

Every tank tested from 1 to 150 lbs., and all fittings tested for hours before leaving our factory.

We guarantee to replace a VITRO Tank that at ANY TIME proves defective from either material or workmanship.

OVER 200,000 NOW IN USE.

Sold by all jobbers.

Cluff Manufacturing Company

LIMITED

81-111 STERLING ROAD, TORONTO, CANADA

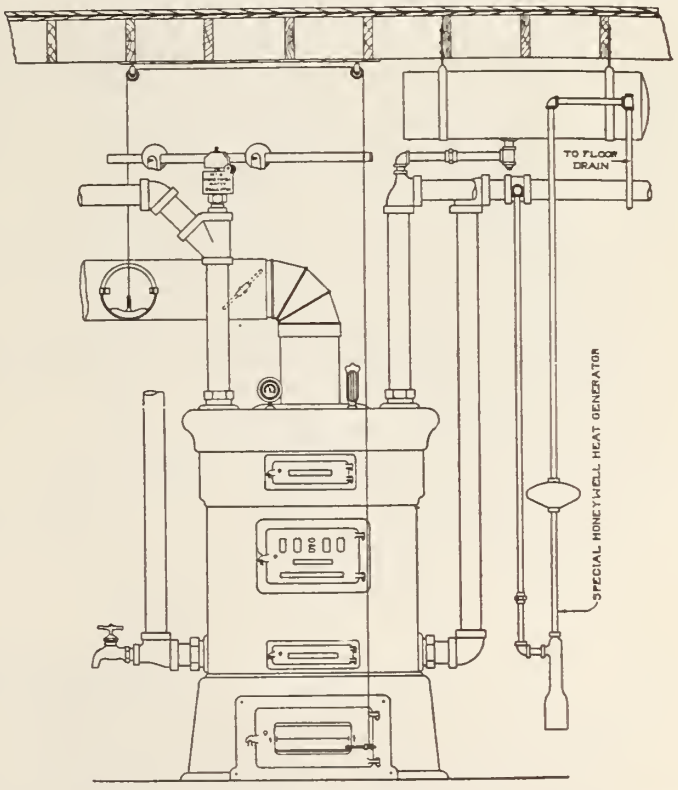
You Can Be Supplied

The need of a dependable Tank-in-Basement method has existed ever since hot water was first used for heating purposes. Fitters have been wanting it for certain installations for a long time. But we wouldn't hurry—we wanted to be absolutely sure that it was right—all right—right in every detail before we brought it out.

To-day we are sure—positive that our Tank-in-Basement method is worthy the name of Honeywell. The fact that it has withstood rigid and exacting tests under the severest of weather conditions, is our reason for offering it to you now.

All the original Honeywell features, which have become so well known during the past ten years, are embodied in our Tank-in-Basement method, in addition to placing the expansion tank in the basement.

Let us tell you how to install the Honeywell Tank-in-Basement method, which will be free from complications and right, down to the minutest detail.



HONEYWELL HEATING SPECIALTY CO., Wabash, Indiana

SANITARY ENGINEER

PLUMBER and STEAMFITTER of CANADA

Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, MAY 15, 1915 No. 10

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THE SANITARY ENGINEER, PLUMBER AND STEAMFITTER OF CANADA

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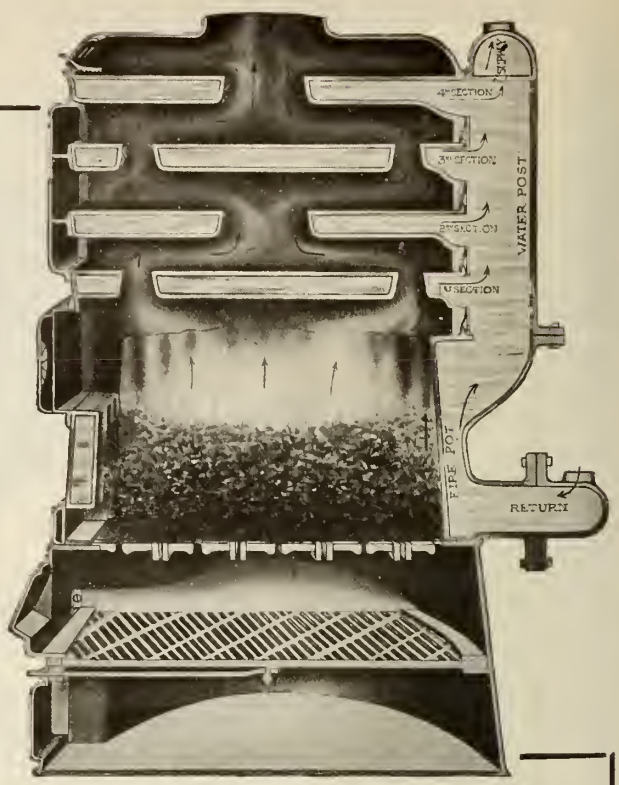

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THE SANITARY ENGINEER

VOL. IX. MAY 15, 1915 No. 10

G. A. Kingston's Address to S. Engineers

Mr. Kingston Gave a Short, Concise Explanation of the Working of the New Act, and Then Invited Questions, to a Veritable Fire of Which he was Subjected, Showing the Keen Interest of the Association in the New Act.

AT the recent convention of the Ontario Society of Domestic Sanitary and Heating Engineers, the subject of workmen's compensation was thoroughly discussed. The Society thought the best way would be to procure the services of G. A. Kingston, one of the commissioners, to address them. Mr. Kingston said that he had not come with the idea of making a speech, but rather to answer questions. The main features of the new measure, he expected, were already well known to those present, through communications from the Board since September last. The speaker expressed a desire to clear up any doubtful questions which might have arisen among the members.

Briefly enunciating the features of the measure, Mr. Kingston said that employers were now divided into four classes:

1. Those in Schedule I to which you belong:
2. Those in Schedule II. — these both comprising Part I. of the law;
3. Those comprised under Part II.;
4. Those referred to under Section 109 of the Act.

The assessments under the Act are based on the estimated payroll of the employer. When we came into office, we found employers in Schedule I., divided into fourty-four classes; for reasons which we considered good, we decided to consolidate these into 35. You belong to class 36, along with the operation of freight and passenger elevators, moving picture shows and theatres.

"Once you pay your assessment to the Board, you are relieved of all responsibility for accidents which may happen to your employees.

"If we have charged you too much, the surplus will be carried forward to next year. For example—if Class 36 is assessed $25,000 this year and the losses in the class only cost $15,000, we shall be able to carry $10,000 forward into next year's account, and a reduction in next year's rate would be the natural thing to expect.

G. A. KINGSTON.

"We will only need a comparatively small proportion of the assessment to cover our working expenses, say from 5 to 10 per cent.—all the balance will be available for payment of accident claims."

After four months of actual working, Mr. Kingston said that the Act was working out very satisfactorily.

In the case of slight accidents, the Commissioner stated that injured men probably got less under the Act than they did before. Previously, he instanced, if a man were only laid up for a short time, employers generally paid full wages and medical expenses, not because there was an obligation to do so, but it was considered wise and the insurance company carrying the risk was usually agreeable to this in consideration of a full release. Under the new measure, if a man is only laid up for six days, he gets nothing; if a week or longer, fifty-five per cent. of his wages but without medical expenses. The chief benefit of the Act lay in cases of serious of permanent disablement or death.

Mr. Kingston then invited questions.

MR. SAINSBURY:—What are the benefits paid after the first week?

MR. KINGSTON:—Fifty-five per cent. of the injured man's wages are sent him by cheque from our office. If a man earning $75 a month, who has a wife and four children, is killed, the widow would receive $40 a month pension, until her children reached the age of sixteen, when the pension would drop $5 monthly until, with all her children grown up, she would be paid $20 monthly for life. Should she re-marry, the Board would make her a wedding present of $480—two years' pension. "In fact," remarked Mr. Kingston, "it would almost look as if we would have a marriage bureau on our hands, on account of the substantial encouragement the law gives to re-marriage."

MR. G. CLAPPERTON:—Is there any probability of provision being made for doctors under the Act?

MR. KINGSTON:—That is for the Government to decide, but speaking personally, I would like to see some provision made for First Aid. It is a difficult problem, however, to work out and possibly it would be fair to suggest that employees should be expected to contribute to any first aid provision.

MR. CLAPPERTON:—Through an accident at our works a man was laid

up five weeks, and the doctor got nothing from the Act.

MR. KINGSTON:—As it now stands, the compensation the injured man gets in most cases is little if any more than enough to live on, so by the time he pays the doctor's bill, particularly in most cases where wages are low, there cannot be a great deal left. Out of 24 States on the other side where Workmen's Compensation is in force, provision of some sort for First Aid has been made in all but one. Quite a number of employers are now forming mutual medical aid associations, deducting a few cents from the employees' weekly wage in order to form a fund out of which to pay the doctors who attend their injured men.

MR. MAXWELL:—Do you take the doctor's word entirely in case of accident?

MR. KINGSTON:—No. When we hear from the employer on form 7, we immediately send forms 6 and 8 to the injured man—form 6 for the man to fill out and form 8 for his doctor to fill out. If these three reports substantially agree, we award compensation based on the stated facts. We get later statements regarding the progress of those injured, and when doctor and employer are both agreed that the man can go back to work, we discontinue the compensation. In fatal cases, or those of permanent disablement, a member or official of the Board usually investigates the case, or if it is more convenient, the witnesses are summoned to appear before the Board.

MR. MAXWELL:—If a man is injured on his way home, how does the matter stand?

MR. KINGSTON:—The liability ceases when a man leaves the premises of the employer. Quite a number of accidents happen after the factory whistle has blown, caused by men hurrying to the time-clocks, or slipping on the stairs on the way down. It has been held that these cases come within the law.

MR. MAHONEY:—If I ask one of my men to make a call for me on his way home at dinner time, am I responsible for any accident that he may meet with?

MR. KINGSTON:—This would turn on the answer to the question—was he acting within the scope of his employment? or possibly on the question, were you paying him for the noonhour?

MR. MAXWELL:—Is the money we pay in to the Board applied to our liabilities alone, or to that of the whole of section 36? If this is the case, will a change be made next year?

MR. KINGSTON:—All industries in class 36 are combined. Of course, we shall know at the end of the year how much each portion of the class cost, and from that we shall be able to decide how much to assess each industry in the class next year, and whether to make a segregation or not.

MR. MAXWELL:—Are the general expenses levied pro rata on each class?

MR. KINGSTON:—Yes. Pro rata.

MR. HASLETT:—Where the engineer awards public contracts, should he not ask the tenderers whether or not they have complied with the Compensation Act. My question is based on a case in London. A friend of mine who contracts on street sewers came to me, and saw one of your circulars lying on the window ledge. I advised him to come under the Act. Although he then had no contracts in view, he wrote to the Board and told them he had paid $2,000 in wages during the previous year. He paid his assessment on six per cent. and then tendered on a city job for $1,955. This included his assessment charges. The contract was awarded to a man who tendered at $1,948. I do not believe that the city engineer ever asked the successful tenderer whether he had paid his dues or not. I claim that a city engineer should always ask this question before a contract is awarded, and thus protect the contractor who abides by the law. At the present time in London, a Cleveland contractor named Nicholson has secured a sewer contract which will probably amount to $200,000 before it is finished. The compensation assessment on a job of this size will be a big item. I do not know whether he has paid or not. The city engineer said it was not his business to ask. This contractor may complete the job without a single accident and get back to the States without having paid a cent's worth of assessment.

MR. KINGSTON:—The point mentioned is a very important one. To show that it is the engineer's business to find out whether a contractor has paid compensation assessment or not. I may say that at the last session the Legislature made municipalities responsible if they paid any contractor without being sure first he has paid the assessment to the Board. All people employing contractors are similarly responsible.

We now have a dozen men going through the Province and calling on every employer of labor. If any have not complied with the Act, we will soon know the reason why. We have a system by which we learn of every contract let inside of a week or two after it is given out, and we immediately levy an assessment to cover the work. We have left no stone unturned in our endeavor to compel every employer to comply with the law, and now the law has been amended so that any employer who does not pay his compensation assessment is individually responsible.

In reply to H. Farthing, Mr. Kingston said that the owner of a house was personally responsible for the compensation assessment if the contractor did not pay.

MR. HASLETT:—Would not the Compensation Act be better administered if the Board had an office in London?

MR. KINGSTON:—Possibly it might some time be desirable; we are not yet impressed with this view. I would rather favor an occasional meeting of employers with the Board or a member of the Board when matters could be discussed in an informal way — just as we are discussing matters with you to-day.

MR. STURGEON:—Is it advisable to appoint an Inspector in our particular line?

MR. KINGSTON:—That is for you to decide. Of course, it would be a charge upon your branch of the class. An Inspector would be useful to urge and arrange for the adoption of safety appliances and to encourage in every way, means for the prevention of accirents.

MR. G. CLAPPERTON:—Who will pay the Inspector?

MR. KINGSTON:—It would be charged to your own section of your class.

MR. L. GIES:—If I send a man out of town to work, am I responsible for him after working hours?

MR. KINGSTON:—The question is not, are you responsible, but, is the man under the protection of the law. The answer turns on the question—was he acting within the scope of his employment. If he was being paid for all his time while travelling to and from the city, he would probably be entitled to protection while so travelling.

MR. RUSSELL:—I take it that time is not a factor in the above-mentioned case?

MR. KINGSTON:—The importance of working hours is not of any importance; the important fact is to know is as to whether the worker was actually employed at the time of the accident.

MR. SAINSBURY:—Can an individual contractor insure in a company instead of with the Government?

MR. KINGSTON:—Not as regards operations under Schedule I; at least, it would not be a practicable proposition. There is no contingency against which he can insure.

Sanitary Engineers and Efficiency

If the Sanitary Engineer is to be More Efficient in These Days Than the Plumber Was in the Past, he Must Devote More Time to Study. Dame Fortune Pays for no Lost Motions. The Busy Bee is the Same To-day as in the Beginning.

By Professor Arthur Bateman, Director, Anglo-American Sanitary Correspondence College, Chicago.

WHEN we speak of the efficiency of a heat engine we mean the ratio of the work done by an engine to the work due to the heat supplied to it.

A good and modern engine will run at 100 per cent. efficiency, but an obsolete type will fall far short of the desired result.

The same remarks apply to your own business, especially at this period when temporary industrial stagnation is so prevalent, yet right now is the opportune moment to bring your efficiency to the maximum.

What do you see when you gaze into a pool of water—the sky above or mud at the bottom? Are you worrying about the dullness of trade you cannot hope to change, or are you optimistic about the future and doing your utmost to increase your efficiency as well as that of your business?

On every side we see unmistakable signs of the return of a more robust and healthy condition of commercial affairs, and the time is fast approaching when your business under efficient guidance will be successful.

What are you doing to increase your efficiency in the meantime, and when do you expect to begin?

Are you going to be one of the 5 per cent. to be in business on your own account at the age of sixty, or will you have joined the throng of failures who are working for an employer or dependent on somebody else for their support at this age?

Can't help it, you say—"trade's rotten." Well, granted it is not all that could be desired, you can help things along wonderfully if you will snuff that tallow candle and burn electric light.

Get right on the efficiency track. Make a few sacrifices to accomplish your purpose and let your beacon light be progression.

The "BEE" is generally supposed to have arrived here before man. It is an exceptionally hard worker, and the organization of these live wires is ideal, but it gets nowhere. There's no progress, because there's no head work: and the honey it makes to-day is exactly the same as it made long before we put in an appearance on this earth. The busy bee was sent to make honey, and it is doing so. Man was placed upon this earth to have dominion over every living creature. He was commanded to replenish and subdue it. Are you replenishing every moment with some progressive accomplishment?

We can have a swarm of bees just the same as we can have a swarm of business failures. Yet, thank goodness, we do find a few men forging ahead, and these are the men who try to get ahead.

PROFESSOR A. BATEMAN.

The men who work for to-morrow instead of to-day. The few who break away from the old methods as practised by our forefathers, who try to find new and better ways of executing sanitary works and processes and find pleasure in working vigorously and interestedly in our glorious profession.

Just have a chat with some old-time plumber and hear him relate the story of how in his day he worked from dawn to dusk. Note his calloused hands and general worn-out appearance: yet the very same person with all his useless toil never accomplished as much as our modern and progressive sanitary engineer accomplishes in the eight hours day.

We've simply got to use the brains God has endowed us with and adopt progressive and efficient tactics if we're going to make good.

Have you ever thought of the very excellent watches we can purchase for a dollar apiece? What makes this low price possible? Cheap material—No. Low wages—No. Efficiency—Yes.

It is true that a few men have embarked in business with little or no technical and practical experience, and by sheer grit and outstanding merit have gotten there all right—but at what a cost. Misdirected energy, 100 per cent. effort. Loss of material. Lack or efficiency and year after year of hardship before their ambition was realized.

But it's different to-day. We see the folly of such a procedure. We realize that the manual worker only averages $1.50 per day, while the head produces anything from $1,000 down to $10 per day.

Why, the man who is 100 per cent. efficient in brain power can reach the sky if he's prepared to make a few sacrifices.

Give your brain more exercise or it will corrode. You won't wear it out with constant use—just ask Mr. Thomas Edison about this.

Break away from the old-time plumber and master the technicalities of sanitary engineering. The evenings will tell whether your destiny will be downward or upward. Invest one hour each evening on study and let your learning make the common people realize the importance, responsibility and magnitude of your work.

Acquire a broader knowledge of your profession and you'll rise above your fellow-craftsmen, and compel your customers to bow down to your superior knowledge.

Adopt the professional air. Dress well. Cut out all slang and profanity. Make your customers extend you the same respect they do the medico or the lawyer. Talk intelligently and convincingly to them.

Be a king in your own workshop and encourage your employees to take a greater interest in their technical and practical work. Preach efficiency. Set an example for them to follow and teach them to hold their heads high and be proud of their profession.

Let the whole atmosphere surrounding your business simply be diffused with efficiency, and you will have little or no time to lament over hard times.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 4.

IN chemistry as in all other sciences we must become accustomed to other than the English standards of length, volume, weight, temperature, etc.

Temperatures used in connection with chemistry the almost universally expressed in degrees of the International Centigrade scale. As we are no doubt more familiar with the Fahrenheit thermometer and its graduations, a comparison will be made between the Centigrade and Fahrenheit scales. Ordinary temperatures are measured on an instrument called a thermometer which may be graduated in a number of different ways and there are the Fahrenheit, Centigrade and Reaumur thermometers. The one generally used for scientific purposes is graduated so that there are one hundred degrees between the freezing point of water and the boiling point of water at sea level. The freezing point is called zero and consequently the boiling point is 100. The temperature indicated by such a thermometer is in degrees Centigrade (or C). The thermometer to which we are all accustomed is graduated so that there are one hundred and eighty degrees between the freezing point of water, which is at 32 degrees, and the boiling point of water which is at 212 degrees. The temperature read from such a thermometer is in degrees Fahrenheit (or F.).

Until we get familiar with the Centigrade scale, a temperature expressed in degrees C. does not convey a very particular meaning. The change to the accustomed Fahrenheit scale is readily made and gives us at first a more definite idea of the temperature.

To change from Centigrade to Fahrenheit multiply the number of degrees C by 1.8 and add 32 degrees (written 32°). The result is the same temperature expressed in degrees Fahrenheit. If it is required to change from Fahrenheit to Centigrade, subtract 32 from the number of degrees F. and divide by 1.8.

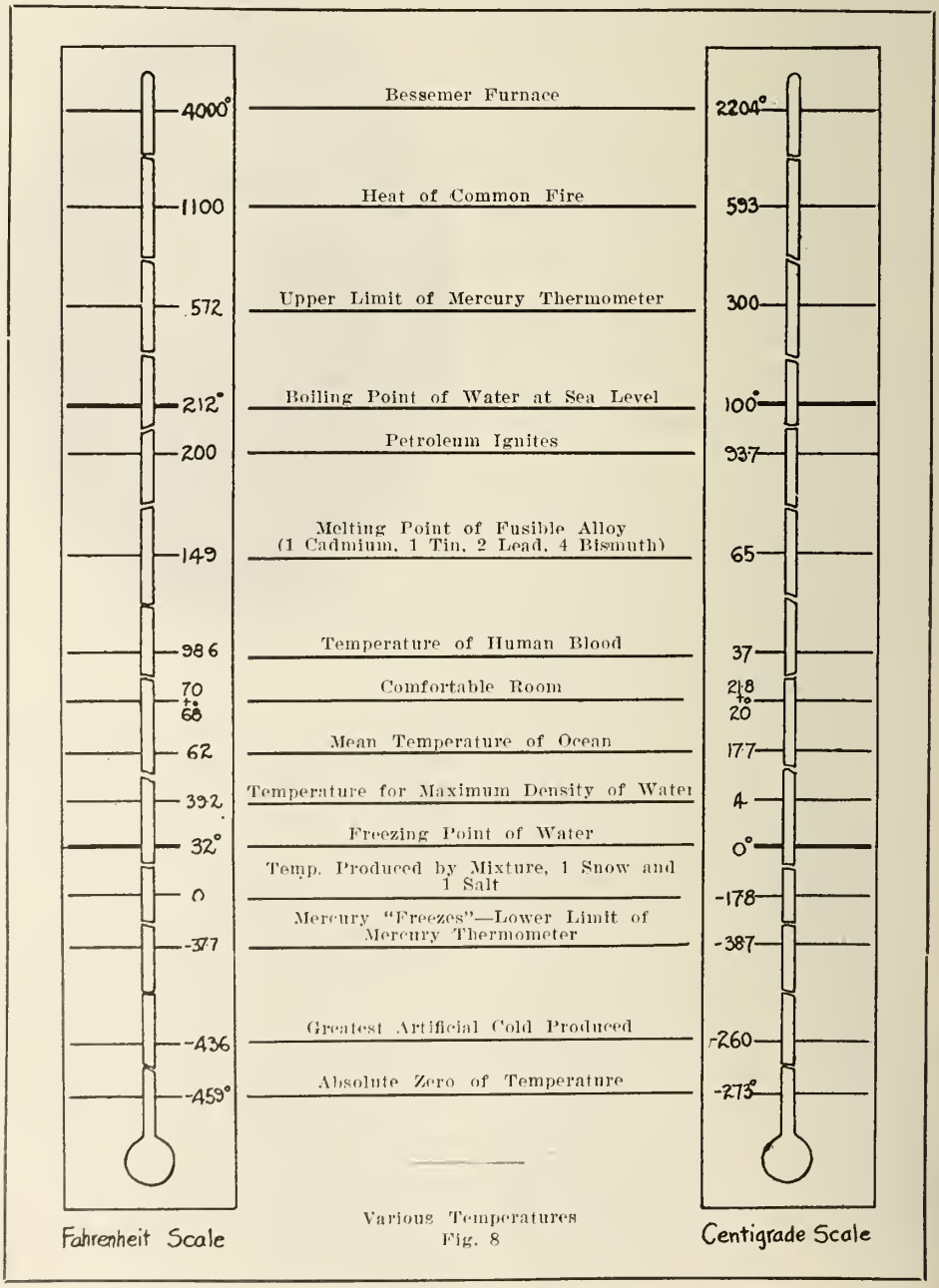
An ordinary Mercury thermometer will measure temperatures from about —39° C. to 300° C. For lower temperatures alcohol can be used in place of mercury and it will measure from —70° to 50° C. To illustrate the change from the Centigrade to the Fahrenheit we will apply our rule to the last two mentioned temperatures:

$$-70^\circ\ C \times 1.8 + 32^\circ = -94^\circ\ F.$$
$$50^\circ\ C \times 1.8 + 32^\circ = 112^\circ\ F.$$

This shows that an alcohol thermometer will measure from —94° F. to 112° F. For the measuring of very high or very low temperatures ordinary thermometers are useless and different methods must be used, which need not be discussed here.

Fig. 8 shows on the Centigrade and Fahrenheit graduations a number of temperatures of particular or general interest.

For measuring length, volume, weight,



Various Temperatures
Fig. 8

etc., the metric system used largely in chemical determinations possesses the initial advantage of being a decimal system with consequent ease in calculation. It has the added advantage that it has become so universal that it is understood by all scientists and used by many. In a great many countries the metric system is the only one recognized. In other countries, while not obligatory its use is legal, as in Great Britain and colonies, United States, Russia, Japan. No difficulty therefore exists in comparing scientific results obtained in different countries.

The metre is a few inches longer than the English yard, our standard of length. The divisions and multiples of the metre and their relation to our measurements are shown in the following table:

To illustrate the comparative ease in calculating with the metric system take a distance of 2 yards 1 foot 7 inches and a distance of 2 metres 1 decimetre, 7 centimetres and multiply each by 4. We are all accustomed to the work involved in calculating with the English system of measurement. In the metric system the distance given can be written by inspection as 2.17 metres, 21.7 decimetres or 217 centimetres. Multiply the last for example by 4 and we get 868 centimetres, which is 86.8 decimetres or 8.68 metres. Changing from centimetres to decimetres or from metres to dekametres can be seen to be only a matter of changing the decimal point.

In the metric system the method of representing other measures admits of the same ease in calculation as is found in the case of length. One cubic decimetre, or one thousandth of a cubic metre is called a litre and is the unit of volume. The litre is about equal to 9/10 of a quart or to be exact 61.027 cubic inches.

The weight of a cubic centimetre at 4° C. is taken as the unit of weight in the metric system and called a gram. The temperature of 4° C. was chosen because water is then at its maximum density, above or below that temperature the same volume of water would weigh less. There are a thousand grams in a kilogram. There are also a thousand cubic centimetres in a litre. Therefore, a litre of water weighs a kilogram. A kilogram is equal to 2.2046 pounds in our own, the English system. To aid in comparison we may recall the fact that a gallon of water under normal conditions weighs 10 pounds, and there are about 6¼ gallons in a cubic foot.

The pressure of air at sea level is about 14.7 lbs. per sq. inch. In chemistry this is generally expressed as 760 mm., meaning that the mercury in a mercury barometer will be held up to 760 millimetres by the pressure of the air. This is equal to 29.921 inches of mercury as can be determined by the relation between millimetres and inches given in Table II.

Like any other material the air exerts a pressure on the earth's surface due to its weight. The higher we get from the sea level the less the amount of air above us and consequently the less the weight or pressure of the air. Due to their nature solids and, to a less extent, liquids remain nearly constant in volume under varying pressures whether of the air or artificially produced. Gases, however, respond readily to a change of pressure and also of temperature. To compare gases it is therefore necessary to observe them at, or reduce results to, the same temperature and pressure.

It has been found that 22.4 litres of any gas at a temperature of 0° C., and a pressure of 760mm. weigh in grams the sum of the atomic weights of the elements composing a compound or if the gas is an element then generally twice the atomic weight of the element. On account of the relation between litres and cubic feet and grams and ounces it

TABLE II.

NAME	METRES	INCHES	FEET	APPROXIMATIONS
Millimetre	1/1000	.03937		1/25 of an inch
Centimetre	1/100	.3937		3/8 of an inch
Decimetre	1/10	3.937		
Metre	1	39.37	3.2809	3 feet, 3⅜ inches
Dekametre	10		32.809	
Hectometre	100		328.09	
Kilometre	1000		3280.87	
Myriametre	10000		32808.69	6 1/5 miles

is also true that 22.4 cubic feet of gas under the above conditions (which can be stated as at freezing point of water and at sea level) will weigh in ounces the sum of the atomic weights. Thus, 22.4 cubic feet of carbon dioxide gas, CO_2, weigh at 0° C. and 760 mm., $12 + 2 \times 16 = 44$ ounces (see Table I for atomic weights).

In table 1 is given the nature of the elements, whether metals or non-metals (metalloids). There is no sharp distinction between the two classes as some elements have partly the nature of a metal and partly of a non-metal. Copper, iron, lead and zinc are unmistakable metals. Sulphur, phosphorus and carbon are as certainly non-metals. But arsenic, for example, while possessing metallic lustre and other metallic properties is brittle and is in its chemical behavoir more of a non-metal.

If either sulphur, phosphorus or carbon (the three elements mentioned as being typical non-metals) is burned, the product of combustion can be dissolved in water. The liquid resulting will have a sour taste and redden blue litmus paper and is called an acid. The reaction when carbon is burned is:

$$C. + 2O = CO_2$$

When CO_2 is dissolved in water we get $H_2O + CO_2 = H_2CO_3$ carbonic acid.

When phosphorus is burned the reaction is $2P + 5O = P_2O_5$ phosphorus pentoxide.

When this is dissolved in water we get $P_2O_5 + 3H_2O = 2H_3PO_4$ phosphoric acid.

In nature acids frequently occur and are found in connection with minerals, the soil, animals and plants. Vinegar, fermented apple juice, is a strong natural acid. Unripe fruits, lemons, etc., contain acids which give to them their sour taste.

As a rule non-metals are the acid-forming substances. In an acid, hydrogen as well is always present and very frequently oxygen.

There are other substances quite the opposite of acids termed alkalies. Moist red litmus paper will be turned blue by an alkali, which has a caustic or corrosive action on the skin and an alkaline taste. Ammonia, building lime and lye are examples of alkalies.

If an acid is brought into contact with an alkali, a chemical action takes place and a salt is formed which will not change either red or blue litmus paper. The acid and the alkali have neutralized each other. The salt formed has a salty taste instead of the sour taste of the acid or the alkaline taste of the alkali. For example hydrochloric acid with soda lye will form sodium chloride (common salt) and water:—

$$HCl + NaOH = NaCl + H_2O$$

The litmus paper mentioned above is an absorbent paper dipped into a solution of litmus, which is a blue vegetable dye obtained by fermenting lichen plants. It has the property of being turned red by acids but becomes blue again when treated by an alkali. Small strips of either red or blue litmus paper made up into "books" can be bought at the druggists. While the reader has not the opportunity or equipment for performing many chemical experiments, at least the acidity or alkalinity of differ-

(Continued on page 23.)

Efficiency of the Water Test

Explaining the Reason Why the Water Test is so Universally Adopted—Its Efficiency Only at the Various Pressures to Which a Soil Pipe Stack is Subjected According to the Height—A More Uniform System Should be Adopted.

NOT very long ago the writer stepped into a building under course of construction, to see if there were any sanitary engineers on the job, and finding several throughout the building, naturally became interested. At the far end of the building, one of the men was up a ladder tap, tap, tapping very carefully at the hub of a T Y, then giving it a rub, then another tap or two, then some impromptu remarks (we won't print the actual words). However, it transpired that the inspector was expected in every minute and the man was up against what he said was a sand hole, but what finally proved to be a cracked hub, and that the stack was full of water, for the water test.

Upon inquiring what pressure there was on the stack at that spot, the man said that there was no pressure, simply a water test. Now this particular stack was over 100 feet high and from the foot of the stack to the top it measured 116 feet. The stack was full of water, which really meant that the plug in the Y at the foot was actually holding back a column of water 116 feet high, yet this journeyman had no idea that a pressure of something like 50¼ lb. per sq. inch was on that stack at the foot, and at the point where he was trying to caulk up a crack, 10 feet up from the foot, it was being subjected to a pressure of 45.91 lb., or nearly 50 lb. per square inch. Just imagine a man trying to caulk up a crack in a cast iron pipe with 50 lb. pressure against it.

Some time later, during the meal hour, the writer called into that same building again, and asked how things were progressing, and in a casual way began discussing the water test, and spoke of the efficiency of the water test and why, and then explained the pressure which stacks of various heights are subjected to, at different points.

To further illustrate our point, we show a soil pipe stack, Fig. 1, which has various points measured off and the approximate pressures to which the stack is subjected at these points. Fig. 2 shows a table which gives the pressure per foot head of water from 1 foot to 100 feet head, in feet. When requiring pressure, because pressure is a something per square inch. See Fig. 3, which shows one pipe ¼ inch in diameter and another 6 inches in diameter; both are 100 feet in height and both are subjected to the same pressure per square inch. No doubt many of our readers to know what volume of water there is in, say, a 4-inch stack, allow 13 lineal feet of pipe to every cubic foot, or approximately 7 gallons of water. The volume of water has nothing to do with the

Height of Pipe	Pounds per Square Inch Pressure	Height of Pipe	Pounds per Square Inch Pressure	Height of Pipe	Pounds per Square Inch Pressure	Height of Pipe	Pounds per Square Inch Pressure
1	.43	26	11.26	51	22.09	76	32.92
2	.86	27	11.69	52	22.52	77	33.35
3	1.30	28	12.12	53	22.95	78	33.78
4	1.73	29	12.55	54	23.39	79	34.21
5	2.16	30	12.99	55	23.82	80	34.65
6	2.59	31	13.42	56	24.26	81	35.08
7	3.03	32	13.86	57	24.69	82	35.52
8	3.46	33	14.29	58	25.12	83	35.95
9	3.89	34	14.72	59	25.55	84	36.39
10	4.33	35	15.16	60	25.99	85	36.82
11	4.76	36	15.59	61	26.42	86	37.25
12	5.20	37	16.02	62	26.85	87	37.68
13	5.63	38	16.45	63	27.29	88	38.12
14	6.06	39	16.89	64	27.72	89	38.55
15	6.49	40	17.32	65	28.15	90	38.98
16	6.92	41	17.75	66	28.58	91	39.42
17	7.36	42	18.19	67	29.03	92	39.85
18	7.79	43	18.62	68	29.45	93	40.28
19	8.22	44	19.05	69	29.88	94	40.72
20	8.66	45	19.45	70	30.32	95	41.15
21	9.09	46	19.92	71	30.75	96	41.58
22	9.53	47	20.35	72	31.18	97	42.01
23	9.96	48	20.79	73	31.62	98	42.45
24	10.39	49	21.22	74	32.05	99	42.88
25	10.82	50	21.65	75	32.48	100	43.31

have experienced greater trouble from joints at the lower end of a stack than at the upper ends, which is fully explained because the higher the joints of a stack, the less pressure are these joints subjected to. Here in Fig. 2 we show the soil pipe stack of an ordinary house, the total length of which is 33 feet. At the foot of the stack, or, shall we say, the joint at the bend, there is an approximate pressure of 14¼ lb. per square inch.

At the basement floor, which is two feet up the stack, there is a pressure of nearly 13½ lbs. The joint at the ground floor is resisting a pressure 10.39 or nearly 10½ lbs. On the bathroom floor there is a testing pressure of nearly 6 lbs., it being 13½ feet from the top, so that it is easily explained why the water test is the most severe test that can be put on a stack.

However, in spite of the fact we believe the day is not far distant when the water test will not be as popular as it is to-day. We have pointed out the severity of the water test upon certain portions of a stack, but we do not think this test to be the most efficient. For instance, refer to the stack shown in Fig. 1. At the bathroom floor, there is only a pressure of a little less than 6 lbs., and if for example another bathroom were fitted up on the upper floor, which is only 4 feet from the top of the stack, the fittings would only be subjected to a pressure of a little over 1½ lbs. Then again in Canada we have a very severe climate as every one of our readers know, and several months of the year the water test cannot in all fairness, or even safety, be demanded.

What is required in all our by-laws is more uniformity, more methods which can be adopted at all seasons of the year, in all climates under every condition, and applying the argument of uniformity in all our methods, would require a uniform method of testing. To adopt some uniform test, would also mean that the soil pipe stack should be subjected to a uniform test, it is not right that one portion of a stack should be subject to anything from 1½ lbs. to 50 lbs. per square inch according to height.

One great disadvantage with the water test, particularly when several tests have to be applied, is experienced when the sewer branch from the street has not been brought to the building line, and there is no place to run the water off the stack into. Another drawback is that all portions of the stack are not as effectively tested as they should be. Finally, the water test can not be applied in winter, when the temperature drops below freezing. Thus it will be seen that all three objections can only be overcome by adopting some uniform method, which would also result in effectively testing every inch of the stack from top to bottom.

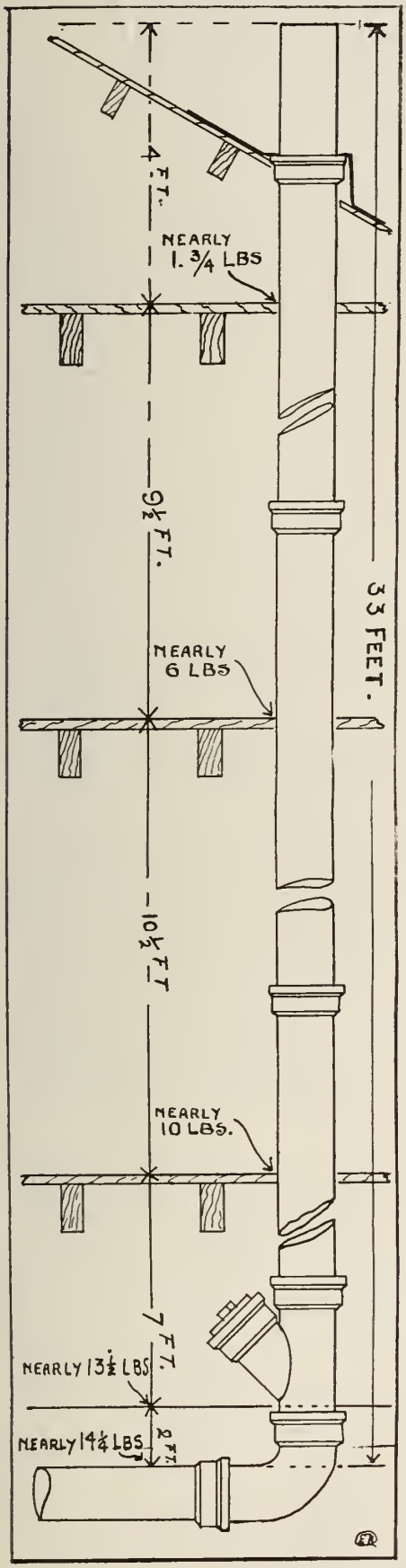
Such a test would be a pressure test, one which would register the same pressure all over. By the use of a smoke machine, the stack could be filled with smoke, and a pump could be brought into commission to raise a pressure. The smoke would be forced through any leak, and in that way the leak would be detected. The pressure gauge would also stand at whatever pressure was predetermined to be put upon a stack.

Such a method would be a boon where a soil pipe stack is several hundred feet high, and one final test would be sufficient, instead of having to put a water test on various sections, as is the case to-day.

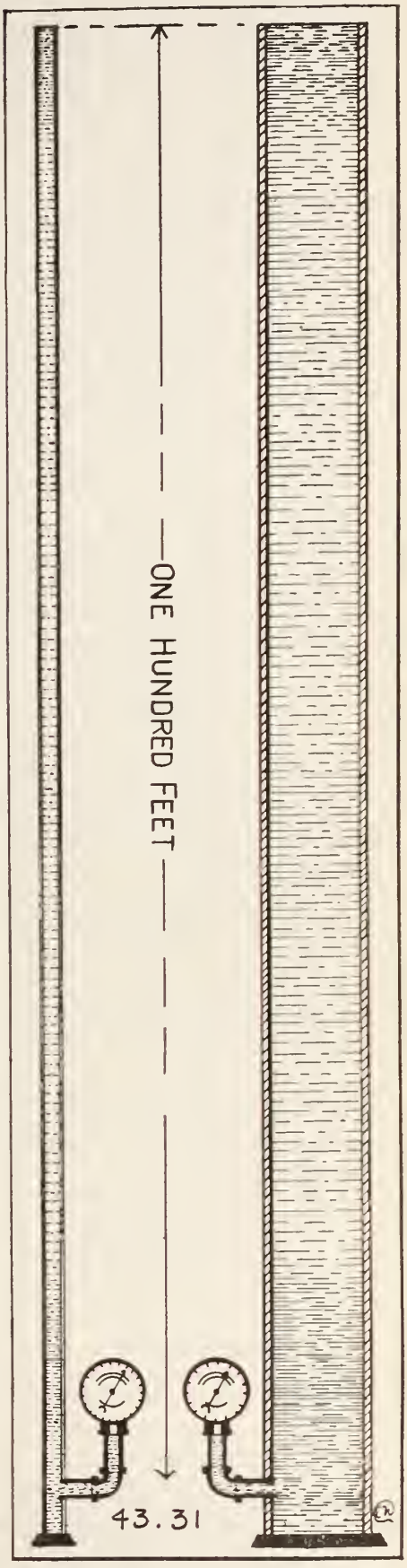
A great many towns and cities in Canada do not demand a water test in winter time, and the installation is passed when the smoke test is applied. It is well known that every job should be subjected to a more effective test than that of smoke, because the smoke test is simply to test the various trap seals. Though it is just as essential, it should not be allowed to take the place of the water or some other pressure test.

It will be plainly seen that if there is ever to be a uniform code formulated to govern the proper installation of sanitary engineering, there must, along with such a code, be some set uniform method of testing, and the test itself must be such a one as can be enforced in all localities, under all conditions, and at all seasons of the year. It must also test every inch of waste, soil or vent pipe effectively.

By adopting such a system of testing, all such tricks as submerging a plug in water at the top of a stack, or caulking a piece of sheet lead into the last length of stack, and a score other fool things which are resorted to by those "botchers," who look upon a practical inspector as the biggest curse to the trade, would be done away with. If these men were fit to engage in the sanitary engineering business, they would all be only too well pleased to have a practical inspector some on the job. We will only be too pleased to have our readers discuss this question of testing in the pages of The Sanitary Engineer, so that we may get a general expression of opinion. It is only by such exchange of our views and ideas that the craft can ever hope to keep pace with progress.



Showing the various pressures a stack is subjected to when water test is adopted.



Showing that a stand pipe 100 *feet high would be subjected to same pressure irrespective of diameter of pipe.*

Proposed Provincial Plumbing By-law

Being a By-law Proposed by the Ontario Society of Domestic, Sanitary and Heating Engineers, and Approved by Them. The Provincial Board of Health Have it Before Them for Further Consideration.

For Plumbing Construction and House Drainage.

FOR some time the various members of the Ontario Society of Domestic Sanitary and Heating Engineers have been working upon a proposed new provincial by-law to govern sanitary engineering construction. The following is a proposed code which is the result of their deliberations. It will be published in full, starting with this issue:

Plumbing and Drainage Regulations 1915, made by the Provincial Board of Health, Province of under authority of Chapter Section Sub-section Public Health Act, 1912.

The following terms in these regulations shall have the meaning hereafter assigned to them unless such meaning is inconsistent with the context:—

(a) Provincial Board shall mean the Provincial Board of Health of the Province of

(b) Local Board shall mean the Local Board of Health of any city or town, which has been or may hereafter be designated as subject to the Plumbing and Drainage Regulations.

(c) Premises shall mean any house, tenement, block, warehouse, school, hotel, theatre, factory or building, either public or private.

(d) Sewer connection shall mean that part of the drainage system of a building or premises which connects the house drain to the main sewer.

(e) House Drain shall mean that part of the drainage system of a premises extending through the cellar or basement to the sewer connection.

(f) Fixture shall mean any receptacle or outlet placed for the purpose of receiving and disposing of waste water or other matters, and connected with the waste, soil or drain pipe of the building.

ADMINISTRATION.

CLAUSE 1.—The following regulations to be known as ..... shall apply to and be in force in all cities and towns in the Province of ..... having a sewerage or waterworks system, and to every other city and town which may hereafter be so designated by the Provincial Board of Health.

CLAUSE 2.—These regulations shall apply to and include all sanitary work hereafter constructed, installed or altered in, for, or about a building or structure of any purpose whatsoever.

This proposed by-law will be published clause by clause in each subsequent issue of The Sanitary Engineer until completed.

It is desirable that the readers should comment upon it as a whole or in part, so that each and every member of the trade may give some thought to this work which means so much to every sanitary and heating engineer in Canada, as well as in Ontario, who has the welfare of the trade at heart. The whole movement is being carried on with a view to seeing that the public is given a better service than in the past.

CLAUSE 3.—The local Board of Health of any city or town in which these regulations are or may hereafter be in force, may by local regulation provide for, require and enforce a better and more improved method of construction in detail, than the standard provided for in these regulations, but in no case shall any construction be permitted which is in any way inferior to that specified in these regulations.

CLAUSE 4.—It shall be unlawful for any person or persons, firm or corporation, to do or have done any work in connection with the plumbing and drainage of any premises, both public and private, hereafter constructed, or at present in the course of construction, and all additions to, alterations in extension or reconstruction of any plumbing and drainage system that do not conform with the following plumbing and drainage regulations which are or shall be from time to time in force in any city or town designated.

CLAUSE 5.—On every street provided with a common sewer the sewerage from each and every building shall be constructed into such common sewer as hereafter provided for. No privy, tank, vault or cesspool will be permitted on any premises situated on such streets, and all buildings located on such streets must be provided with suitable water-closets and necessary sanitary conveniences.

CLAUSE 6.—Before proceeding to construct, re-construct, renew, add to, alter or extend any portion of the plumbing or drainage system of any building or premises, the owner or persons constructing or having charge of same shall file in the office of the Local Board of Health an application for a permit therefor.

CLAUSE 7.—The application for such permit shall be in writing and there shall be filed with such application specifications of the whole plumbing and drainage system, together with drainage plan of such premises, and also of work proposed to be done showing description, location and sizes of all parts of such system and also a particular description of the building and premises.

CLAUSE 8.—Such plan or specification shall be approved or rejected by the Board within three days and if approved, a permit for the work shall forthwith be issued and shall be valid for a period of six months unless the work is then in progress and uncompleted, otherwise a re-submission and approval of the plan and specifications must be had before the work is undertaken.

CLAUSE 9.—After a plan or specification has once been approved, no alteration or deviation shall be allowed without the approval of the Board on a written application of the owner or his agent.

CLAUSE 10.—The owner of premises in connection with which any work is being done without a permit, for the doing of which a permit is necessary under these regulations, shall as well as those persons actually doing the work be deemed guilty of a violation of these regulations.

CLAUSE 11.—No contractor, master plumber, plumber, or drain layer engaged by the owner of any building or premises to construct, re-construct, alter or repair any portion of the drainage or plumbing system shall do any work in connection with such construction, re-construction or alteration at or upon any such building until such contractor, master plumber, plumber or drain layer has satisfied himself that the owner has filed his application and received a permit as required by Section eight of these regulations.

CLAUSE 12.—All applications shall be on forms to be provided by the local Board and all plans and specifications shall be made on such forms as shall be approved by the local Board.

CLAUSE 13.—The use of any plumbing and sewerage system which has not been approved by the Provincial Board of Health is hereafter prohibited.

INSPECTION.

CLAUSE 14.—All work contemplated as required in these regulations shall be done in a workmanlike manner and shall be subject to the supervision, inspection and approval of the Medical Officer of Health, or any inspector appointed by him.

CLAUSE 15.—All plumbing work required by these regulations shall only be done by a licensed master plumber or by a practical and experienced plumber in the employ of such licensed master plumber.

CLAUSE 16. — All plumbing and drainage work shall be tested by the plumber in the presence of the Inspector, by a water test and smoke test. All faulty or defective work or material which may be discovered shall be condemned and removed and the work made good, and when found satisfactory a certificate shall be issued to the plumber. If the work is not made satisfactory within a specified time, no certificate shall be issued and the penalties prescribed by these regulations may be enforced forthwith.

CLAUSE 17.—The smoke test shall in all cases be applied to finished plumbing work in the presence of the Medical Officer of Health, or inspector appointed for that purpose, by the master plumber or workman who is doing the plumbing work, before he, or they, hand over the plumbing work to the owner or his agent, and no plumbing work shall be considered complete which has not had a smoke test applied and found tight; for the purpose of this clause, plumbing work shall be considered finished when all the fixtures are fixed in their place. When work is found tight and satisfactory, the plumber shall receive a certificate for same.

CLAUSE 18.—The Local Board of Health shall be notified from time to time when any work is ready for inspection, and all work must be left uncovered and convenient for examination until inspected and approved by the Plumbing Inspector. The inspection is to take place within two working days of receipt of notice for inspection.

CLAUSE 19.—The Medical Officer of Health shall with the approval of the city or town council, appoint such inspectors of plumbing as may be found necessary and who shall be practical plumbers with at least 10 years' experience; such inspectors thereafter shall be under the supervision of said Medical Officer of Health and the Provincial Board of Health.

INSTALLATION.

CLAUSE 20.—The entire plumbing and drainage system shall be separate and independent of that of any other premises. Special cases, such as double tenements or apartment houses, etc., shall be referred to the Local Board, who shall decide whether a separate system must be installed or otherwise, and issue the permit accordingly.

CLAUSE 21.—All parts of the plumbing system shall be concentrated as much as possible and protected so as to prevent freezing. All soil, wastes or ventilating pipes shall be located inside the premises and readily accessible in case of repair.

CLAUSE 22.—In the installation, alteration or extension of any plumbing or drainage system, all dead ends or unused pipes shall be avoided, but where soil or waste pipes are installed for future use, the ventilating pipes shall also be installed, and the whole tested as if intended for immediate use and all ends made perfectly gas and watertight, and provisions made to carry off condensation.

HOUSE, DRAIN AND SOIL PIPES.

CLAUSE 23.—The house drain shall be of cast iron and shall not be less than four inches (4 in.) in diameter and the fall to the sewer shall be on an even grade of not less than one-quarter of an inch per foot throughout its entire length. It shall be laid in a trench cut to a uniform grade, or if above the surface, it may be supported on brick piers or suspended from the floor beams by heavy iron or steel hangers. It must commence at a point at least five feet (5′) outside the external wall of the premises and be extended undiminished in size inside the building and continued on as a vertical soil pipe and ventilating pipe to a point at the roof three feet (3′) above any opening which may be within fifteen feet (15′) of same, and three feet (3′) above any opening into any adjoining building or extension where such opening is within fifteen feet (15′) of such pipe—and be left open so that the whole of the plumbing system may be thoroughly and constantly ventilated.

ROOF TERMINALS.

CLAUSE 24.—The terminals of all soil, waste and ventilating pipes shall extend through the roof to a height of not less than one inch or more than four inches above such roof, and shall be made watertight and weather proof with a five-pound sheet lead or 16-oz. copper flashing. Pipes of three inches (3″) diameter or less shall be increased one inch (1″) in diameter before passing through the roof of the premises.

HOUSE TRAP.

CLAUSE 25.—A house trap shall be inserted in the house drain as near as possible to the point where the house drain leaves the cellar and no connection shall be made to the house drain on the sewer side of the trap except as hereinafter provided for as per section No. 95. Such trap shall be of a form approved by the Local Board and shall correspond in weight and quality to the other portions of the house drain and shall be provided with a suitable handhole for convenience in cleaning.

FRESH AIR INLET.

CLAUSE 26.—A fresh air inlet shall connect with the house drain immediately inside of the house trap. It shall consist of a pipe not less than four inches (4″) in diameter and shall be extended outside the external wall of the premises to a point at least twelve inches (12″) above the ground and shall, where practicable, be placed not less than ten feet (10′) distant from any window, door or other opening in the premises, and shall be finished off with a return bend. In no case shall a fresh air inlet be connected directly over the house trap.

CLEAN-OUTS.

CLAUSE 27.—A cleanout shall be placed on the house drain as close as possible to the point where it enters the building and on the sewer side of the house trap, and shall be formed by placing a full "Y" on the drain and extended to or above the floor and so placed as to be readily accessible.

CLAUSE 28.—Cleanouts shall be provided at the foot of all vertical lines of soil and waste pipes and at all right-angle changes in direction—distance between cleanouts should not exceed fifty feet (50′).

CLAUSE 29.—The cleanouts on house traps, drains and stacks shall be of the same diameter as the pipes to which they are attached, except where the drain or stacks are more than four inches in diameter, in which case the cleanout shall not be less than four inches ((4″).

CLAUSE 30.—Cleanouts fitted for cast iron shall be properly jointed into faucets or hub. In no case shall they be fitted into a plain piece of pipe.

CLAUSE 31.—All cleanouts shall be of a pattern approved by the Provincial Board of Health.

SOIL, WASTE AND VENT PIPES.

CLAUSE 32.—All house drains, soil or waste or vent pipes shall be of cast iron, galvanized wrought iron or brass, except for branch waste and vent pipes, which may be constructed of drawn lead.

(Continued on Page 30.)

The Sanitary Engineer

Plumber and Steamfitter of Canada

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TORONTO, MAY 15, 1915

A Vital Necessity

WE are all more or less desirous of seeing better laws instituted for the proper installation of sanitary and heating engineering, both in our cities and rural districts, particularly the latter. We are all convinced that the method of appointing a medical practitioner as health officer is not as desirable as it might be. For instance, there are scores of small villages and districts where the only medical man is appointed by the local council to the position of medical officer, but because of business ties he cannot be expected to enforce the law. We had a case brought to our notice recently where a medical gentleman was appointed to the position and within a mile of his residence there were found tons of raw offal from slaughtered animals. This medical man was aware of the state of things existing, but, because he was likely to lose business he did not enforce the existing law governing this matter. There is not a district in Canada but what has its medical officer of health, properly and legally appointed, and yet there are very few wells, lakes, rivers and navigable waterways but what are to some extent in a polluted state, particularly where cesspools exist. This latter state of affairs goes to prove that the appointment of a medical officer of health as is at present customary, is not sufficient or efficient. It cannot be expected that a man appointed to such a position, who has to depend upon the inhabitants for a living can afford to make every person in his district live up to the law.

The writer knows of, and lived in, one village where there was, up to less than 2 years ago, only one septic tank installed, and where just across the road from the medical officer's own residence a cesspool was put in, and no bones made about it.

We can therefore conclude that we have had enough of the medical officer of health. What is wanted is a country sanitary inspector, a man appointed to the position because of his practical qualifications, a man thoroughly in sympathy with every sanitary measure which could be adopted and practically carried out; a man who is not only an expert, but also a sanitary engineer. No other type of man can or would be likely to do justice to such an important position or to the people whose welfare he would have to study.

With such thoughts in mind, The Sanitary Engineer is publishing in each issue a course, specially written for its readers in as simple a manner as possible, by a man who is at heart a sanitary expert, not by any means for what there is in it, but for the good of those who are in the business of sanitary and heating engineering as a calling, and for those who are to be the future guardians of our health and happiness.

A Valuable Asset

A FEW weeks ago we published an article showing what mail order houses were doing to dispose of plumbing fixtures. We expressed our views very strongly as regards the advice given by these mail order people re the construction of the various plumbing installations and we still maintain that no such scheme should be allowed to exist. We maintain that all such work should be executed by none but practical men, and all installations should be made after a proper permit has been granted by the local board of health.

One very prominent thought which should convince every sanitary and heating engineer of the great possibilities of the country districts as a field for selling plumbing goods is that these mail order houses realize that the farmer and rural resident is a valuable buying power in their business. The very fact that big advertising campaigns are being conducted to capture orders for plumbing goods should convince the trade that there is business to be gotten for the going after it.

This business is new. It is of a type that should be the best. The work should be carefully executed to ensure the very best service. The fixtures should be the best, though not necessarily the most expensive by any means, but rather the most serviceable. The reason is plain. When a farmer or rural resident installs sanitary and heating appliances, he is away from any base of supplies for repairs. He cannot call in a sanitary and heating engineer at a moment's notice, and therefore should have the best equipment installed which will carry an almost unlimited guarantee for durability. Another point to consider is this: The year 1914 showed that the total revenue derived from agriculture in Canada amounted to over 600 million dollars. Such being the case, it cannot be denied that the buying power of such a class of producers must be great.

No one knows better than the sanitary and heat-

ing engineer of the comforts and conveniences which can be installed on the farm. Therefore it should be the aim of every one in the trade to cultivate this field.

True Success vs. War

WE, the British people, are at war. We are engaged in the bloodiest and most savage conflict which has ever been waged in the history of the world, and why, may we ask? We are at war because we believe in freedom. We believe in fair dealings. We believe in the weaker being protected from the ravages of the stronger, because we have ceased to believe that might is right, but rather that right shall be might.

Yet who are they to whom we may turn so as to assist us to choose and know what is right, and who are they to whom we may look to hand out right principles, the jobber, the sanitary engineer or the public at large?

The Kaiser and his people have expended all their forces to gain commercial supremacy. They have resorted to just such trade tricks as are being practised every day amongst ourselves, yea, at this very day, and they excuse themselves that "War is War." They say "all is fair in love and war." We, as well as the Kaiser and his people, say "business is business," but is it? What is business? Is it putting a lower grade of goods out to meet the price? Is it price-cutting? Is it "robbing our neighbor as well as ourselves?" or what? There is just as heartless a war being waged to-day, commercially, as the European war, which had its beginning because of commercial warfare.

Let us away with this curse, this canker worm which we call business. Let us cut out this cold-blooded commercialism, and inoculate ourselves with some of the spirit of the brotherhood of man. Let us examine ourselves and the methods we have of conducting our business. Cease this barter and do unto others as we would that they should do to ourselves.

The whole trouble in the sanitary and heating business is that the big fellow tries to gobble up or trample down the little fellow, the little fellow, if he is a practical man, has just as much right to exist as the big fellow. Next, we should all recognize the proper channels from which to buy our goods. The most contemptible thing in business for a man to do is to try and over-ride the legitimate source of supply. Sanitary and heating engineers complain that manufacturers are supplying consumers, etc., but are they themselves any better? Its a well-known fact that the whole business structure is wrong. The sanitary and heating engineer wanting a keg of butter or a crate of eggs, would buy them direct from a wholesaler if a dollar or two could be saved: the same with the manufacturer, and the same when the grocer wants a plumbing or heating job done. He'll try and get some "friend" to get the supplies for him, and have some botcher to install them. But what is the remedy? It's right here: Buy your groceries from the grocer—all along the line. Don't recognize the mote in thy brother's eye, if thine own vision is obstructed by a beam.

Success consists not in having a big bank account. If it does, then let us continue this European war until there's not a living soul on earth. Robbie Burns' words:

"Man's inhumanity to Man
Makes Countless Thousands Mourn"

are just as true to-day as they ever were.

The Optimism of Advertising

A WORD that is frequently misused is "optimism." A man engaged in any business whatever who looks for success without exercising his faculties to achieve it, is not an optimist, but a fool. The true optimist is the man who hopefully faces conditions as they exist.

The following article from the New York *Outlook,* dealing with the inherent optimism of advertising is reproduced here because of its practical value for the business man:

"Two things make advertising almost a synonym for 'optimism.' One is that the advertiser who would be successful must be an optimist. The other is that when an advertiser loses his optimism he generally cancels his advertising.

"Business is rotten," exclaims the manufacturer, and forthwith orders all his advertising stopped, little realizing that his own action is one of the causes that makes business rotten.

Cancelling advertising is so easy that it is nearly always the first step toward retrenchment. The matter is seldom decided on its merits. It is impulse. Advertising must be an expense, the advertiser reasons. Therefore to cut it off effects a saving.

The stoppage of advertising during times of stress and change has two bad effects upon the business involved. It turns off immediately a method of securing new business and holding old business. In addition to that, it advertises the pessimistic views of the advertiser, and therefore spreads his own lack of faith in himself, his goods, his country, and the future to other business men who are, perhaps, also on the verge of doing the same thing.

The point is that the war will either end everything in the world or it will not. If it does not, business, among other things, must go on. In our own country it must go on now. It cannot wait until the war is over.

In this country there are a hundred million of us who must live and who must buy all the things that make life possible, and somebody is going to supply these things.

There are very few articles that we cannot make or produce. We have now an opportunity to find out what we can do. All of these new resources will develop business and that activity which ultimately results in good times.

Every manufacturer who has been in the habit of advertising and who can get materials from which to manufacture his goods, ought to push on with his method of selling goods, advertising included, just as in normal times. If he is a real advertiser he will realize that at such a time his competitors will probably relax their efforts, and he therefore will make a corresponding advance in his."

Editorial Briefs

CREEPING INTO the lives of men everywhere is the thought that co-operation is better than competition —we need one another, and by giving much we will receive much.

—Elbert Hubbard.

* * *

THE MAN who does not do his own thinking is a slave, and is a traitor to himself and to his fellowmen. —Ingersoll.

* * *

THE MAN who is a success is he who gives greatest service to most men, excepting himself.

Getting After New Business

Sanitary and Heating Engineers in Large Towns and Cities are "Seeking" and "Finding" Business—Becoming Better Salesmen Every Day—Quite a Large Number are Realizing an Improvement in Their Business.

Sixth Article of this Series.

NEVER in the history of the sanitary and heating engineering business have members of the trade paid so much attention to advertising as they are doing to-day. For the most part in days gone by business has come to them; there has been no need to go after it; but to-day, when speculative building is almost at a standstill, something must be done to keep one's head above water.

If we study the sanitary and heating business a little, and those who are engaged in this calling, we shall find that the most necessary requirement in the general make-up of any business man these days is that of salesmanship.

We have thousands of splendid mechanics in all walks of life; we have inventors by the scores; we have splendid managers, etc., all of whom are necessary, but the one essential qualification which most men lack is that of salesmanship.

To be a good salesman does not simply mean a clerk behind a counter, or even a traveller on the road, both of whom require to be experts in their various lines. It is one thing to sell an article and another thing to get a person to buy something. For instance, a certain kind of salesman may dispose of goods and persuade the customer that a certain thing is good value, and so eventually effect a sale; but such accomplishments do not prove successful salesmanship.

If, however, a salesman calls upon a certain prospective customer, studies out that customer's line, and can see plainly enough that the goods he wishes his customer to buy will prove of service to him, will improve his customer's environment, will raise the moral tone of his surroundings, and, lastly, will actually render service to the buyer, if he then persuades his customer to buy, it will not be merely a matter of selling something, it will be a case of having shown the customer that he ought to buy.

Such a salesman has not only disposed of a certain commodity, but has actually rendered his customer a service; he has shown him either how he can make money, how he can effect a saving, or how he can improve his surroundings.

Now, coming back to our particular line, the sanitary and heating engineer must become more of a salesman, and to do so must know more about the lines he carries, the cost of doing business, and the reason why he must increase his business. He must be able to find out first who needs work to be done, and what kind of work or installation will best serve each particular case. He must be in a position to show his prospective customer why he should spend or, shall we say, invest a greater amount of money in his bathroom sanitary and heating equipment.

As we have stated many a time in The Sanitary Engineer, the bathroom and other sanitary and heating equipment is the last thing to receive any consideration.

A person desiring to build a house always has the impression that plumbing and heating should be pared down to the last possible cent. But if that same person were to consider the furnishing of a parlor or dining room, every consideration would be given and the matter of $50 or $100 would be neither here nor there.

Now how can we account for this state of affairs? The kitchen, the laundry, and the bathroom are the three most important portions of any home, or building for that matter.

It is simply because sanitary and heating engineers have not been as efficient salesmen in the past as they should have been. It means that if sanitary and heating engineers are to become successful in the future they must advertise; they must know what to advertise and how; they must state what service they can and are prepared to render to the public.

Speaking to a fellow-traveller on the train the other day, the writer stated

Modernizing Country Homes

Sewer and Water, Electric Light and Steam Can be Installed at Small Cost.

Out in British Columbia the lumber dealers are looking for good business this Fall, when the prosperous farmers of Alberta, Saskatchewan and Manitoba will all be building barns and houses with the proceeds of this year's record crop at record prices.

It is never safe to count chickens before they are hatched. Farmers complain that the cries of "bumper crop" every spring and summer have a tendency to keep the price of wheat down just when the farmer has to market his grain, while a few months after it is found out that there was not a bumper crop after all, and the speculators reap the big profit.

However, there is no doubt that the largest area ever sown in Western Canada will soon be sown, with the land better worked than in any previous year, and with prospects good for a good crop and a good price. There is also no doubt that there will be a great deal of building in the country, with good homes and barns going up, and that farmers who make good money this year **will improve conditions on the farm instead of moving to town or city.**

To-day there is no need of farmers moving to town to get all the modern conveniences of water supply, hot and cold water, electric light, an up-to-date bathroom and toilet, steam heat in every room in the house, and all at a lower cost than city people pay.

One firm in Saskatoon is so convinced of the change coming in the average country home that they are specializing on modernizing country homes, and have already transformed several farm houses in the Saskatoon district into comfortable, modern homes, with all city conveniences. The people going back to the land this year are in many cases going back to stay, and the fact that they can have modern homes in the country will be a powerful appeal to many women who like the country but not its inconveniences.—Saturday Press & Prairie Farm.

The above reading matter appeared just below Beatty & Brady's advertisement.

COMFORT ON TAP
24 HOURS PER DAY

Let Us Instal Your Bathroom

And the Recollection of Quality
Will Remain Long After Price is Forgotten.

IND. PHONE 64. BELL PHONE 60.

Make an appointment with us. **J. McINTYRE,** We employ Skilled Plumbers.
WHITBY, ONT.

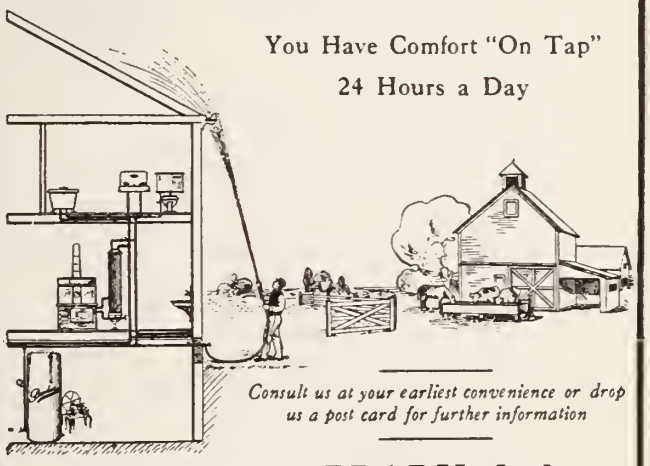
Don't Move to the City for City Conveniences

YOU CAN HAVE

CITY COMFORTS ON THE FARM

When You Equip Your Home and Farm Buildings

With HEATING, PLUMBING, LIGHTING and a PNEUMATIC WATER SYSTEM

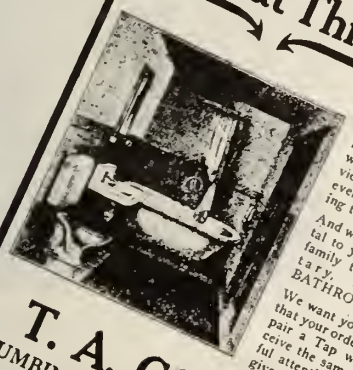


You Have Comfort "On Tap"
24 Hours a Day

Consult us at your earliest convenience or drop us a post card for further information

BEATON & BRADY, Ltd.
SANITARY & HEATING ENGINEERS
P.O. Box 641 SASKATOON, SASK. Phone 2854

Look at This Picture



It will remind you that the name "COWAN" stands for quality, good workmanship, service and stability in everything pertaining to PLUMBING.

And what is more vital to you and your family than a sanitary, convenient BATHROOM?

We want you to feel that your order to repair a Tap will receive the same careful attention that is given to our large contracts.

T. A. COWAN
PLUMBING HEATING LIGHTING

HAVE YOU A MODERN BATHROOM IN YOUR HOME?
IF NOT, WHY NOT?

WE can equip your home, whether in town or country, with every city convenience — Heating, Bath Room, Hot and Cold Water at the Tap.

How to Get Full Information

Call at our establishment and we will show you how, or drop us a post card and we will call upon you at your convenience.

IND. PHONE 64. BELL PHONE 60.

J. McINTYRE, HARDWARE, PLUMBING and HEATING
WHITBY, ONT.

Have You a Modern Bath Room in Your Home? If Not, Why Not?

In Town or Country

We can equip your farm, home and buildings with every city convenience. Heating, Lighting, Sewage Disposal System, Bath Room, Hot and Cold Water at the Tap, Pneumatic Water System and Efficient Fire Protection.

How to get full information

Call at our establishment and we will show you how, or drop us a post card and we will call upon you at your convenience. Estimates furnished free.

W. H. DUSTAN, Sanitary and Heating Engineers
Phone 74, Bowmanville

Showing that sanitary engineers are devoting more time to the advertising problem, which cannot fail to bring business.

that the sanitary and heating engineer who could not guarantee an installation for five years, providing the price was paid, was not fit to be in the business, whereupon my friend replied that he would soon be building a residence, and would make such a stipulation. He was told to pay the price and he'd get the value. The trouble has been with our craft that they have tried to meet the price, instead of creating a reputation for good work. The happy man of to-morrow is not the one who can sign the cheque with the most figures on its face, but rather the man who has given a square deal to every person he has ever met, including himself. To do so these days, one must adopt means which will reach the greatest number of people at one time, and do so regularly. The cut appearing with this article is a small reproduction of various advertisements, which show what some of the members of the craft are doing, and no doubt they are reaping some benefit. We find in looking over various newspapers from all over the Dominion that sanitary and heating engineers are using more printer's ink to-day than ever before in the history of the trade. They are linking up with more business-like methods; they are getting business, and are, therefore, beginning to create that most important feature of all successful enterprises— that of becoming efficient salesmen.

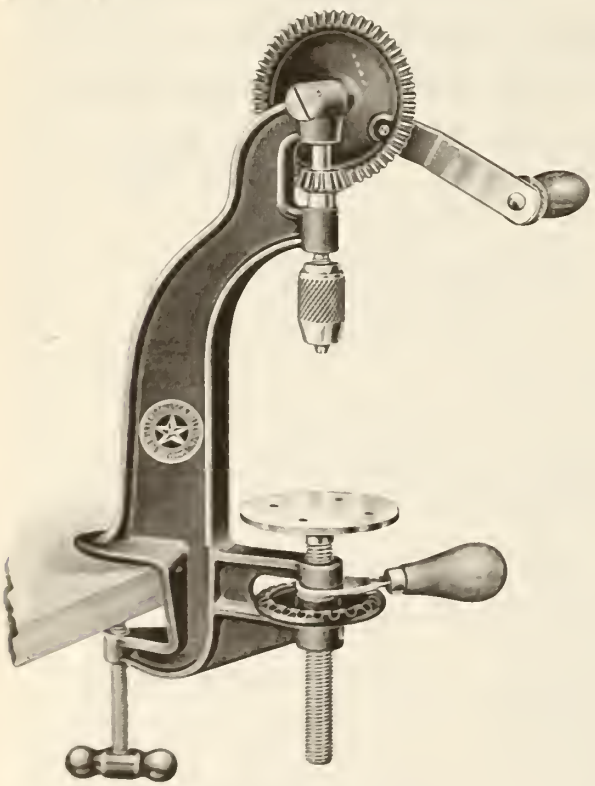
NEW HEATER INVENTED.

Frank Goodwin, plumber of this city, has received a patent on an instantaneous water heater, and will manufacture the machine both in Sarnia and in Port Huron, where plants are being installed. The plant in Sarnia is being placed in a building in the rear of Mr. Goodwin's plumbing shop on Christina Street. The machinery is already here and is being erected.

New Sanitary and Heating Goods

BENCH DRILL PRESS NO. 208.

An attractive bench drill press of very moderate cost and known as No. 208, has just been put on the market by the Millers Falls Company, of Millers Falls, Mass. The illustration herewith will show its general lines and character. The finish of the standard is gray with red edging, and such parts as chuck and crank are nickeled. The chuck has a capacity of 0 to ¼ inch for round shank drills and is of the popular Star pattern with three jaws operated by springs that are protected from injury and guaranteed not to get out of order. The small gear is of steel and the tool is equipped with ball bearings. The chuck is held rigidly close to the main frame and feed is obtained by raising the table with a ratchet lever. The table is provided with holes for the insertion of pins or screws to act as stops or rests for the work. The height over all is 18 inches; maximum distance from chuck to table, 4½ inches; speed of gears, 3½ to 1; weight, 7½ lbs.



Bench Drill Press No. 208.

made this novel and progressive step. It is claimed that where the expansion tank in the attic or top floor is either objectionable, or is apt to freeze when so installed, that the tank may be placed in the basement as shown by the accompanying drawing. Further particulars may be procured by writing to the above address.

LIGHTNING BUG LANTERN.

Stewart, Skinner Co., Worcester, Mass., offer to the trade the Lightning Bug Electric Lantern here illustrated. This lantern requires the ordinary No. 6 single cell battery, which is used for door bells, telephones, motor cars, etc., and which can be purchased for 25c.

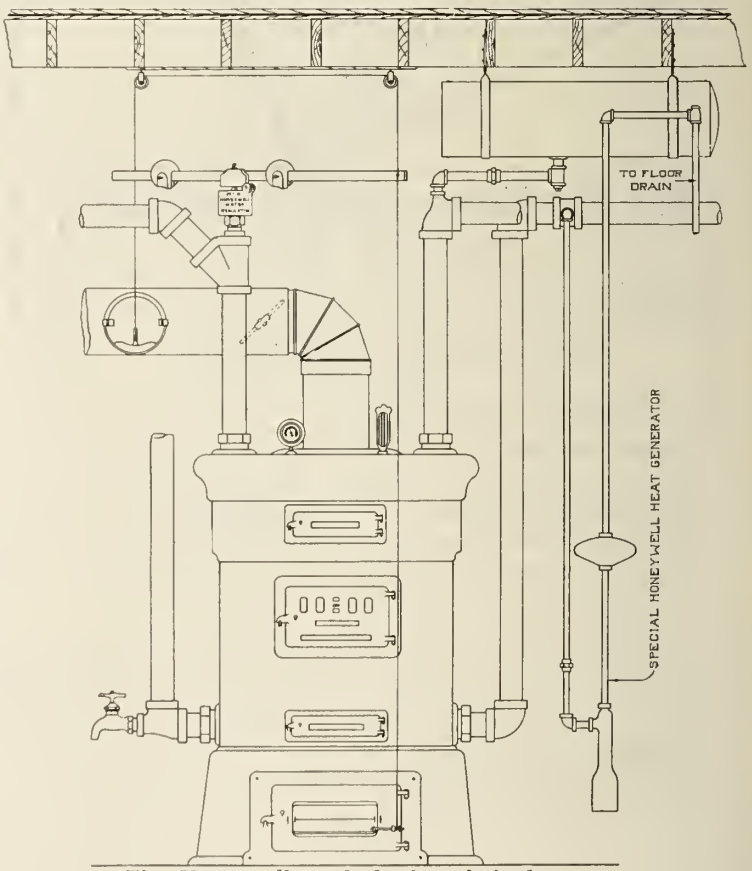
The makers claim the lantern is indispensable in the home, barn, garage, camp, etc., and it is always ready for use.

The reflector furnished in connection with the Lightning Bug is made of a white metal which takes a very high polish.

The added brilliancy of this metal is claimed by the makers to produce one-third more light than of electric lanterns which have reflectors made of brass and are either silver or nickel plated.

Owing to the new scientific angle of the reflector, it is said, the maximum amount of light is obtained without the use of condensing lense. In its place is

Lightning Bug Lantern.



The Honeywell method of tank in basement.

TANK IN BASEMENT.

One of the most recent improvements in hot water heating systems is that of the tank in basement system. The Honeywell Heating Specialty Co., Wabash, Indiana, are the people to have

used the ordinary clear straight glass which can be replaced at very little expense in case of breakage.

This reflector is designed to spread the light rather than to give the searchlight effect which is produced by any illuminating device in which a concentrating lense is used.

The widespread light gives an abundance of light close by instead of throwing a narrow stream of light at a distance.

The switch is so located that light can be turned on or off with the same hand in which the lantern is carried, and the position of bail or handle is arranged to accommodate the natural position of hand.

NEW DIE STOCK.

Another very novel pipe-threading tool is being placed upon the market by A. B. Jardine & Co., Hespeler, known as the "Jardine" Adjustable Threading Tool, No. 9. It will thread right or left in all sizes, ranging from ⅛ to ¾-inch inclusive; viz., five different sizes. The same principle is applied in this tool as in all the "Jardine" lines, in that the cutters recede to produce the taper.

"Jardine" Adjustable Threading Tool, No. 9.

Further particulars may be furnished by any jobber, or direct from the makers, A. B. Jardine & Co., Hespeler, Ontario.

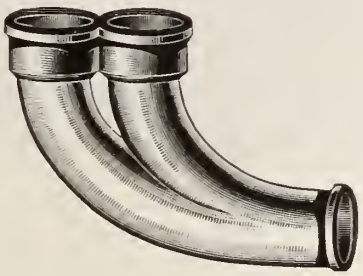
NEW ADDRESS.

J. R. Devereux & Co., manufacturers' agents, whose address was up to recently 142 St. Joseph Boulevard west, have moved to more commodious premises. They represent quite a number of houses both in Canada and the United States, and will now be better able to cope with any business which comes their way.

Mr. Devereux is well known to quite a large circle of friends, and will be pleased to welcome any of them at the new address, 233 St. James street, Montreal, Que.

A NEW SOIL PIPE FITTING.

The Anthes Foundry Company, Ltd., Toronto and Winnipeg, are turning out a new soil pipe fitting as shown herewith. It is very popular in the West, having first been made by the Winnipeg factory for the St. Boniface sanitary engineers. It is called the "St. Boniface" Stack fitting or base bend. In the West this fitting is used at the foot of the stack, it has a wide radius, thus giving it a long



St. Boniface Stack Fitting.

sweep. Either of the hubs can be used on the stack, the spare opening being left for the clean-out. Further particulars may be obtained regarding this new fitting by writing to either the Toronto or Winnipeg factories, or to the local plumbing supply houses.

PRACTICAL SANITARY SCIENCE.

(Continued from page 15.)

ent substances can be tested. Weak acids and alkalies as well as neutral salts do not act on litmus paper and other more delicate tests are necessary. Also, as a rule, only substances that are soluble in water will give results with litmus paper, which should always be moistened in testing dry substances.

As mentioned, hydrogen is always present in an acid. The chemical action when a metal is "attacked" by an acid is explained by the fact that the hydrogen of the acid is replaced by the metal to form a salt. If, for example, sulphuric acid is poured on zinc then the zinc is destroyed by being changed to zinc sulphate, which has none of the properties of a metal:—

$$H_2SO_4 + Zn = H_2 + ZnSO_4.$$

When a metal is combined with oxygen and hydrogen, the resultant hydroxide compound is termed a base. As a rule, metals are base forming substances while, as before mentioned, the non-metals are acid-forming substances. A base and an acid will react to form a salt and water. Potash lye or potassium hydroxide, a base, with nitric acid forms saltpetre or potassium nitrate and water:—

$$KOH + HNO_3 = KNO_3 + H_2O.$$

We have now discussed a few of the elementary facts in connection with chemistry and will later apply them as we find the need. The two main branches of chemistry are inorganic and organic. The inorganic treats of metals and metalloids. All living matter contains carbon and the branch that treats particularly of carbon and its compounds is called organic chemistry. Theoretical chemistry has to do with the laws governing chemical action while applied chemistry treats of chemistry in its relation to commerce and science. Applied chemistry may be considered as agricultural, medical, sanitary, etc., depending on its application. The chemistry inorganic or organic, required for the purposes of the sanitarian is designated sanitary chemistry.

(Continued in next issue.)

WAR TAX STAMPS.

Enquiries having been received in regard to postage stamps being used for the prepayment of war duties on bank cheques, bills of exchange, promissory notes, express money orders, proprietary or patent medicines, perfumery, wines or champagne, as well as upon letters and postcards, postal notes and post office money orders, notice is hereby given, that this use of postage stamps is in strict accordance with the provisions of the special War Revenue Act, 1915, which provides that postage stamps may be used in lieu of Inland Revenue war stamps in fulfilment and discharge of any requirement under the Act that adhesive stamps be affixed.

The public is at liberty at all times to use postage stamps for any purpose for which Inland Revenue war stamps may be used, but it is especially provided in the Act that Inland Revenue war stamps are not to be used on letters, postcards, postal notes or post office money orders, the only stamps allowed on these being ordinary postage stamps or postage stamps upon which the words "War Tax" have been printed.—Post Office Department, Ottawa.

DOES NOT PAY.

It does not pay to contradict a customer flatly no matter how certain you are of being right. The customer may not mind being told that he is wrong but the chances are that he will resent it and get peevish. It's a way people have when they are in the wrong.

WHEN THEY RETURN.

The war will return to Canada many crippled and disfigured men. Let the industries of Canada, by the exercise of wise precautionary measures, so reduce their toll of injured as to offset, as far as possible, the abnormal increase from war.

Practical Course for Sheet Metal Workers

ARTICLE No. 16 OF SERIES

By CHARLES SEIVERS

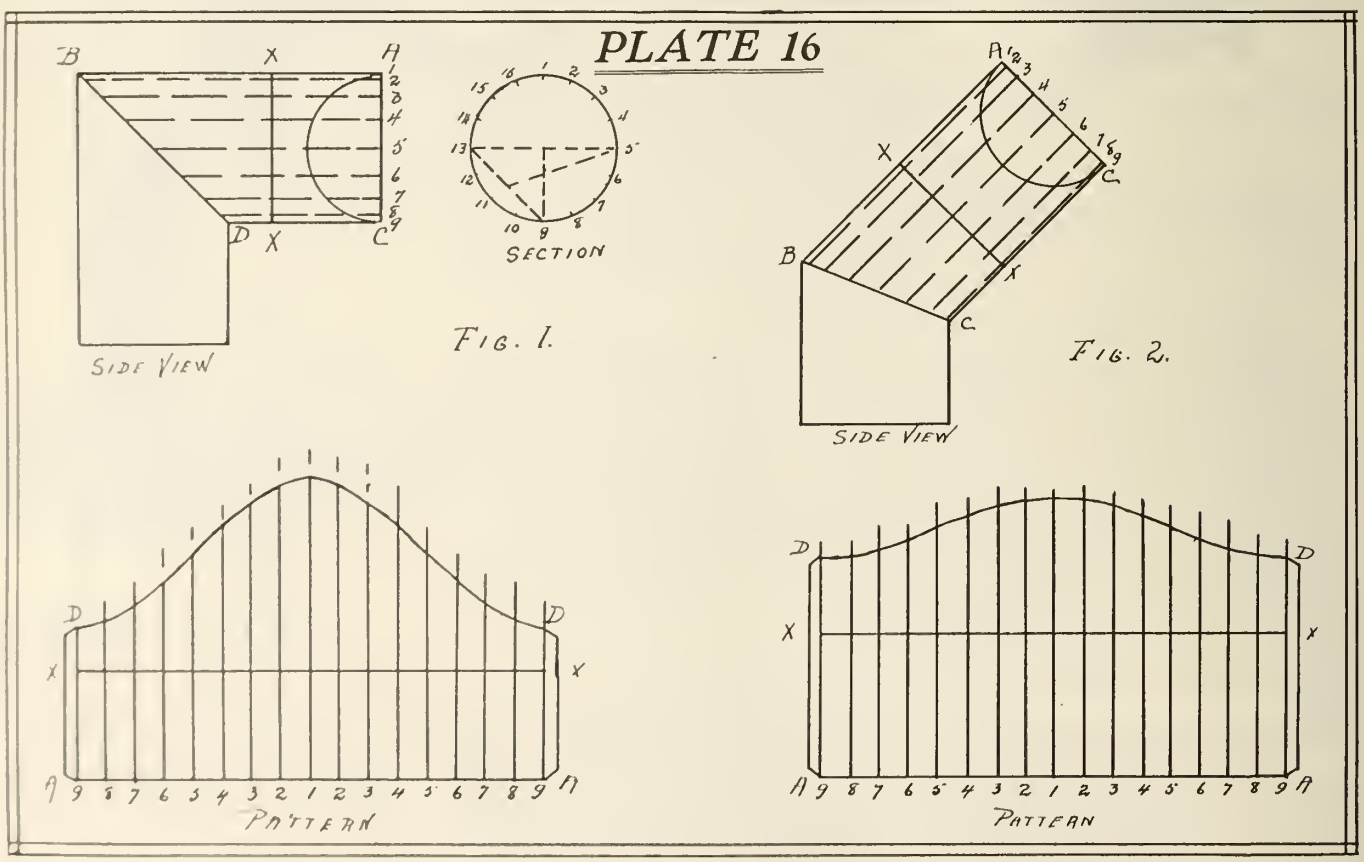
IN this issue we are taking up problems more of a mechanical nature. Most of the articles previously published have been of an educational, or geometrical nature, and while there are several ways to develop elbow patterns, the methods shown here will be found to be about as simple as possible, and are adopted in a great many tinshops at the present time.

In Fig. 1 is shown a right angled 2-piece or 90 degree elbow and Fig. 2 an angle or 45 degree elbow of two pieces. The development of each is done by adopting practically the same method.

Having drawn a side view of the elbow Fig. 1 and obtained the cutting or mitre line, the developing of the pattern can be gone on with. At one end as shown, draw a half circle of the diameter of the pipe and divide into a number of equal parts as shown by 1, 2, 3, 4, 5, 6, 7, 8, 9. Through these divisions draw lines parallel to the sides, cutting the mitre line B-D. To mark off pattern, draw two parallel lines as A-A and X-X, At one end draw a line at right angles connecting them, as A-X. Rrom this point mark off the spaces on section or half circle at end of side view, repeating to make circumference complete, draw lines connecting the different points extending them past X-X. From A-C on side mark off a space equal to the distance apart of the two lines A-X on pattern, as shown by X-X on side view, this line will be used as a point from which to obtain the different lengths. With the compasses or dividers, measure the distance from the line X-X to mitre or cutting line D, and mark off from X on line A-X of pattern, this line corresponds or is the same as division numbered 9. Then measure from the line X-X to D-B on each of the other divisions and mark off in divisions on pattern marked with same number. A line drawn through the points thus obtained will give the outline of the pattern required. The angle elbow shown in Fig. 2 is worked out in the same manner, and requires no further explanation. The dotted lines shown in section in Fig. 1 from the diameter, as shown by the line 5-13, now draw a radius at right angles as shown by the line to point 9 and draw a line connecting two of the points on the circle, thus obtained, as 9 and 13. Bisect the line 9-13 and from the point obtained draw a line to end of diameter at point 5, the distance from point 5 to X is equal to one-quarter of the circumference.

MARITIME PROVINCE.

We have a report that the Maritime Province is to some extent coming into its own. Business never was what might be called booming, but the businessmen have built up a nice reputation all round for their products. They are now enjoying a well-deserved, prosperous time. Building is fair and the outlook very promising indeed. Such being the case, sanitary engineers will also reap their share of the good things.



GOSSIP OF THE TRADE

CAPT. T. D. LOCKHART WAS KILLED IN ACTION.

The whole town of Galt was shocked when the news reached there that Capt. Thomas Downey Lockhart was killed in action on the morning of April 23. The information came in a letter to his brother, Archie Lockhart, of Berlin, from Lieut. P. W. Pick, who says he was the only officer not seriously wounded in Lockhart's company of the 1st Battalion. The news was more startling because Captain Lockhart was about two weeks ago officially reported wounded, although it had been impossible to secure any further word until the sad message by mail was received.

"He was leading his platoon," says the letter, "in a charge against the enemy, and just before reaching an old trench about six hundred yards from the enemy was struck by a bullet. He was carried into the trench and lived only a few minutes.

Captain Lockhart was 35, and was born in Ayr, Scotland. He had resided in Galt several years, coming here from Toronto. He was head of the firm of T. Lockhart & Company, sanitary and heating engineers, and had established a very creditable reputation for good work. He was an active member of the Ontario Society of Domestic Sanitary and Heating Engineers, and held the esteem of every one of his fellow-members. A prominent bowler and curler, he had a wide acquaintance throughout Western Ontario, having played in the tankard games of 1913-14. He was a member of the Masonic Order.

He held a commission with the 29th Regiment, Highland Light Infantry, Galt, but was formerly with the 12th York Rangers and the Queen's Own Rifles, Toronto. He left Galt in command of a company recruited here. Two brothers, a sister and his mother survive.

CORPORAL JACK MOUNT WOUNDED.

Sanitary and heating engineers throughout the whole Dominion have and are contributing their share in the defence of freedom, as shown by the long list to be seen from time to time sent from the battle front.

Jack Mount, son of John A. Mount, a well known sanitary and heating engineer, of the firm of Mount & Sons,

LATE CAPT. T. D. LOCKHART.
A Galt officer who is reported killed in action on April 23.

1404 Main Street, Winnipeg, is reported to have been wounded.

It is to be hoped he may have a speedy recovery and safe return home.

THE SANITARY ENGINEER A GOOD BUSINESS INVESTMENT.

Editor Sanitary Engineer,—You will find enclosed postal note value $1 being one year's subscription for The Sanitary Engineer.

I find your journal increasingly interesting and instructive, and consider this dollar, the best spent, of my business expenditure. Respectfully yours,

J. E. Casson,
Victoria, B.C.
803 Catherin St.,

* * *

Sanitary Engineer,
Toronto.

Gentlemen:—

We are pleased to tell you that the advertisement we put in the April issue of your paper is bringing good results. To-day we have received nine inquiries, several of which have been profitable to this company.

The fact of our having received four from Saskatchewan, one from Quebec, one from New Brunswick and three from Ontario convinces us that The Sanitary Engineer covers much territory in a short time.

Wishing your continued success, we are, Yours respectfully,

THE DOMESTIC BURNER CO.
(Per W. J. Doran.)

TO REBUILD WOLVERINE CO.'S PLANT AT ONCE.

Work is to be started on the rebuilding of the Canadian Wolverine Company plant just as soon as contracts can be let, was the statement made recently by Mr. L. A. Cornelius, president of the company.

The directors of the company held a business meeting, when matters in connection with the new building were discussed and several other matters taken up.

Those who were present from outside the city were Messrs. Charles Bakmever, of Winnipeg, and L. A. Cornelius and H. C. Cornelius, of Grand Rapids.

VACUUM STREET CLEANING.

An Ideal System for Canadian Roadways.

In Huddersfield, England, recently, a demonstration was given of a motor-vacuum street cleaner, the invention of an Italian.

The machine is operated upon the principle of a rotary brush and suction, together with a system of pumps and jets for spraying atomized water on the road surface in front of the brush, thus insuring dustless and hygienic sweeping. The tests were made on various conditions of roadways, some being specially prepared to give the machine a stiff test. It is stated that the result was excellent, and apparently it will not be long before a much-needed revolution in street

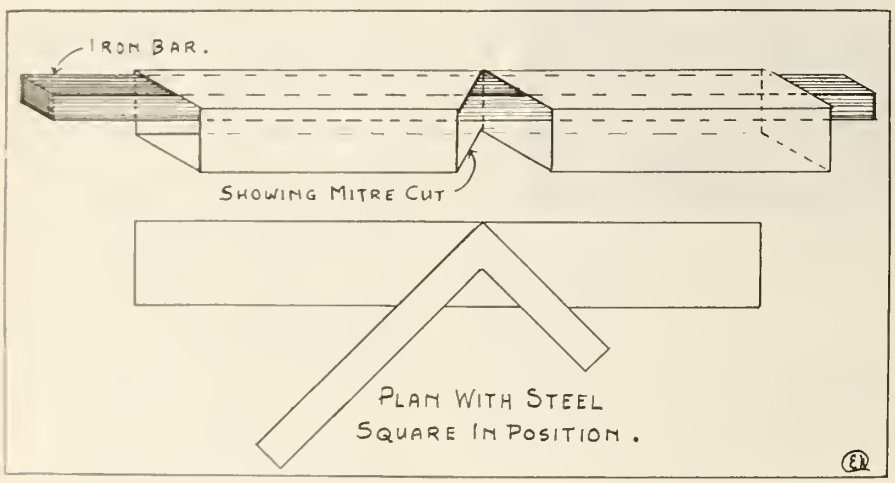
(Continued on page 30.)

Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

HOW TO CUT A SQUARE PIPE.

Editor The Sanitary Engineer.—I take a great deal of interest in the information you give from time to time on sheet metal work.

We do not have enough work in that line to employ a tinsmith regularly, and I am often asked to put up local vents in a plumbing job. Can you show me in your next issue how I can cut a square pipe so as to make a mitre? I get the



square pipe in lengths and find it a little difficult to cut a mitre when the pipe is already made.

Local Vents.

Fig. 1 shows how a mitre can be cut, as well as a square pipe. All that is necessary is a sharp chisel and a square bar. If you take a little care you will be able to cut any angle whatever and not waste an inch of pipe. The joints should be made tight or the efficiency of the local vent will be greatly reduced. To see the way some local vents are installed is enough to turn one's hair grey. Even though the plumber has had no tinsmithing experience, he should be able to make a neater job than some that are often seen.—Editor.

WHICH IS PROPER?

Editor Sanitary Engineer,—I have read from time to time in The Sanitary Engineer that you are a strong advocate of simplified plumbing. I would, therefore, like to ask you a few questions re the matter.

We have a fairly good plumbing by-law in our town, but crown venting is distinctly called for, as also is the matter of connecting the waste from the lavatory and bath into the lead bend. That is, of course, in a residence with one bath room.

I wanted to put a 4 x 2 cast iron Y in the soil pipe stack just under the T. Y, which was needed for the w.c., and our inspector would not allow me, he is a pretty good fellow, but insists upon the letter of the by-law being carried out.

I have pointed out some of your arguments to him, but he is firm in the matter. Can I ignore the by-law, and install what would really be considered an improvement?

A. S. M.

You could not ignore the by-law A. S. M. under any pretence. If you are so interested in making plumbing construction simple, we would advise you to discuss the matter with your fellow-craftsmen in your town, call upon the health department in a body after having prepared a suitable set of clauses to be embodied in your present by-law, or say amendments to the present existing clauses.

While The Sanitary Engineer advocates simplifying plumbing construction, we do not endorse the action of any person who wilfully breaks an existing by-law. Because various clauses in a by-law are not in keeping with good practice is no reason why persons should break them.—Editor.

* * *

HOW TO SECURE A PATENT AND HOW TO SOLDER ALUMINUM.

Editor Sanitary Engineer,—Being a subscriber to The Sanitary Engineer and seeing that you invite subscribers to ask questions, I would esteem it a great favor, if you would answer me the following questions in your journal:

First. How may I solder aluminum? I have a stick of aluminum solder for the purpose, how should I go about it?

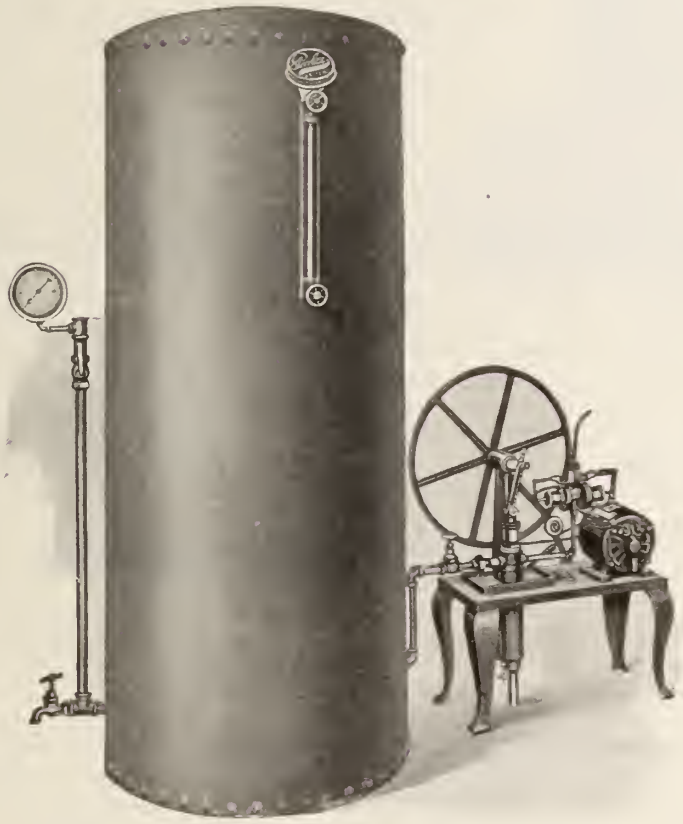
Second. I have made a self-seating air-tight cap or stopper for tin bottles, cans or drums. How must I go about it to secure a patent? Also to get it on the market?

Jas. R., Sask.

To Secure Patent.

To secure patent, application must be made to the Commissioner of Patents. It is usual to have an application prepared by a patent solicitor, such as Fetherstonhaugh & Co., Ottawa, who is familiar with the way specifications and claims must be prepared in order to meet the requirements of the Patent Law. When the patent is issued it may be sold to manufacturers or royalties

(Continued on page 30.)



There may be an apparent saving of a couple of dollars in buying a "piece-meal" outfit, but subsequent troubles cost a lot of money—Peerless Water Systems don't give trouble.

QUESTION BOX.

(Continued from page 28.)

may be granted under it to manufacturers who wish to make it.

To Solder Aluminum.

To solder aluminum, proceed as follows: Clean the part to be soldered, then take a gasoline torch and light it; regulate to a blue flame, not necessarily a forced blast, apply a little of the aluminum solder and rub the solder and part with the end of an old file. The portion to be soldered as well as the file point must be kept in the flame. Simply rub both the melted solder and file against the part to be soldered, the whole to be beneath the flame. No flux is required, and after a little experimenting it will be possible to make a good job.—Editor.

• • •

LAUNDRY TRAP PLUGS AND COLLARS.

Editor Sanitary Engineer.—Can you inform us in your next issue of The Sanitary Engineer of any Canadian manufacturer of pressed brass collars, strainers and plugs for laundry traps in 12 to 14 gross lots.

Peerless Artificial Stone Co.,
35 Symington Ave.,
Toronto.

Canadian Wolverine Co., Ltd., Chatham, Ont.; Canadian Lamp & Stamping Co., Ltd., Ford, Ont.—Editor.

• • •

WHO MANUFACTURES VACUUM VACUUM CLEANERS.

Editor Sanitary Engineer.—Could you inform me who manufactures vacuum cleaners?

John T. Matthews,
Sanitary and Heating Engineer.
Burlington, Ont.

The following are the names of Canadian manufacturers as well as the names of the machine they manufacture: Tuec—United Electric Co., 159 Richmond street, west, Toronto, Ont.; Acme—Acme Vacuum Cleaner Co., Montreal, Que.; Invincible—Invincible Renovator Mfg. Co., 81 Peter street, Toronto, Ont.

• • •

WHERE TO PROCURE PNEUMATIC TANKS.

Editor Sanitary Engineer.—Will you kindly inform us where we can procure pneumatic tanks for water systems?

Illsley & Harvey Co., Ltd., Port Williams, N.S.

National Equipment Co., Ltd., Toronto, Ont.

General Machinery Co., Ltd., Toronto, Ont.

F. E. Myers & Bro., Ashland, Ohio.

Toronto Iron Works Co., Ltd., Toronto, Ont.

John Stevens Co., Winnipeg, Man.

J. H. Ashdown Hardware Co., Ltd., Winnipeg, Man.

Empire Manufacturing Co., Ltd., London, Ont.

—Editor.

DEFINING A NIPPLE.

A nipple is a fitting made from tubular goods, and usually threaded on both ends. It is under 12 inches in length. Pipe over that length is referred to as cut pipe.

A close nipple has no shoulder and is about twice the length of a standard pipe thread.

A shoulder nipple has any length. It derives its name from the shoulder of pipe left between the two threads. A shoulder nipple is intermediate in length between a close and a short nipple.

A short nipple is slightly longer than the lengths of the two threads, being a trifle longer than a close nipple. Some unthreaded shoulder exists between the two threads.

A space nipple contains a shoulder between the two threads, and may be of any length allowing a shoulder.

A sub-nipple is a substitute nipple, or, in other words, a short pipe with different styles of thread on its ends.

A swage nipple is a reducing nipple, having one end smaller than the other.

A long screw nipple is made up of a short length of pipe; one end has a standard thread, the other is threaded far enough to allow a coupling and locknut to be turned by hand without overlapping the pipe end. It is an advantage when making a connection, or for connecting pipes in place.—Power.

VACUUM STREET CLEANING.

(Continued from page 27).

cleaning will be brought about by the motor-vacuum system.

Canadian cities and towns are intensely interested in this question, as, owing to climatic conditions, the vacuum system of street cleaning is particularly adapted to this country. Not only is it necessary to utilize such a system of cleaning of streets and roadways, but every house should be equipped with a stationary vacuum cleaner. It may be asserted that stationary vacuum cleaners are an expensive commodity. But that is rather a debatable point. The terms expensive and costly can only be properly used when viewed from the point of efficiency of service. What portion of an equipment can give more actual service in a home than a good stationary cleaner? We can see that in the not very remote future every board of health will demand that each house be equipped with such an appliance, which without doubt is just as necessary as the present-day sanitary fixtures which are required to be installed in every modern home.

PROPOSED PROVINCIAL BY-LAWS.

(Continued from page 19.)

CLAUSE 33.—When wrought iron pipes are used for soil, waste or vent pipes, the burr formed on the inside by cutting shall be carefully reamed out to the full size of the pipe and be threaded with a full tapering thread and brought up butt to the shoulder of recess in the fittings.

CLAUSE 34.—No waste pipe from any fixture shall be connected to the closet bend, but shall connect directly with the main soil or waste pipe.

CLAUSE 35.—No waste from any refrigerator, ice box, cold storage or other receptacle in which foodstuffs are kept or stored shall be connected direct to any drain, soil or waste pipe, but such waste pipe shall discharge into an open water supply fixture or floor drain properly trapped and vented. Refrigerator wastes shall be separately trapped and so arranged as to permit of frequent flushing and be as short as possible. When two or more refrigerator waste pipes are connected together or to a stack, they shall be extended through the roof of premises for ventilation.

CLAUSE 36.—All vertical pipes and stacks shall be properly supported at their base and at intervals of not more than fifteen feet (15′). All horizontal cast iron pipes shall be supported at intervals of not more than five feet (5′) by strong wrought iron or steel pipe hangers or on brick piers. All horizontal lead pipes shall have continuous supports throughout their entire length.

MATERIAL, QUALITY AND SIZES OF PIPES.

CLAUSE 37.—The diameter of soil and waste pipes shall not be less than those specified in the following tables, and no waste pipe shall be less in size than the trap it serves.

Main soil pipe	4 in. dia.
Main soil pipe (for building six or more floors)	5 in. dia.
Branch soil pipes	4 in. dia.
Main waste pipes	2 in. dia.
Branch waste pipes for slop sinks	2 in. dia.
Branch waste pipes for pedestal slop sinks: Not less than outlet of trap	
Branch waste pipes for sinks, bath or laundry tubs	1½ in. dia.
Branch waste pipes for three or more fixtures	2 in. dia.
Brach waste for lavatory basins	1¼ in. dia.
Branch waste pipes for other fixtures	1½ in. dia.

(Continued in next issue.)

Quick Hot Water at a Big Saving
——of Gas——

ONE MINUTE AFTER THE

Stack Gas Water Heater

IS LIT IT GIVES HOT WATER AT THE TAP

This is actually the most durable and long-lived Copper Coil Gas Water Heater made—it is the easiest and quickest to instal.

Cost but little more than the ordinary heater, but the extra cost is quickly covered by the savings effected.

EASILY SOLD ***BIG PROFIT***

James Morrison Brass Mfg. Co.

Limited

93-97 Adelaide Street West, Toronto

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

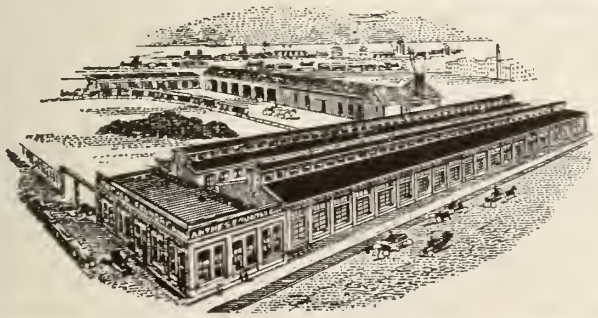
Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

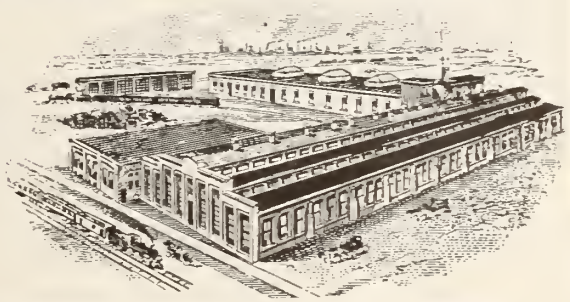
New York, N. Y.; London, Eng.; St. Louis, Mo.

TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG



MANUFACTURERS OF

CAST IRON SOIL PIPE AND FITTINGS



ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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Armstrong Mfg. Co. 32

B. O. T. Mfg. Co. 2
Beaton & Cadwell 4

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Dart Union Co. ..... Inside Back Cover

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Steel Radiation, Ltd. 10

Warden King, Ltd. 3
Wallaceburg Brass & Iron Mfg. Co., Ltd. 9
Williams, J. H., & Co. 32

Consulting Sanitary Engineer

Advice and plans on

Water Supply and Sewage Disposal for Residences, Factories, etc.

H. L. SEYMOUR, B. A. Sc., A. M. Can. Soc. C. E.

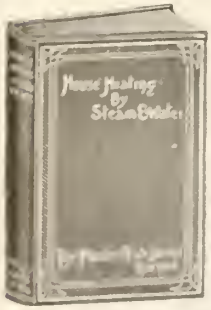
BOX 95. SANITARY ENGINEER TORONTO

Second Edition Just off the Press!

Heating by Steam and Water

A Practical Treatise on House Heating

By Chas. B. Thompson

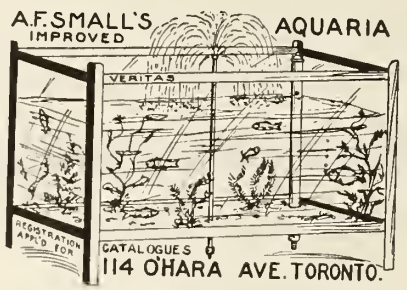


Illustrates and describes improved methods of installing heating apparatus in the home; short and accurate rules for computing radiation, heat losses, etc.; graphic charts showing boiler, power and coal consumption; accurate data consisting of charts, illustrations and descriptions of how best to heat water for baths, swimming pools, etc.

268 Original Drawings
Price $3.00

Plumber & Steamfitter,

143 University Ave., Toronto, Ont., Can.

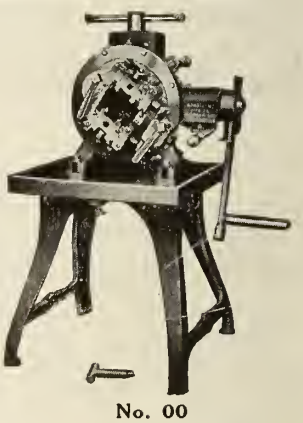


Condensed or "Want" Ads.

TECHNICAL BOOKS

ELECTRIC WIRING AND LIGHTING. BY Charles E. Knox, E.E., Consulting Electrical Engineer, and George C. Shaad, E.E., Formerly Associate Professor of Electrical Engineering, Massachusetts Institute of Technology, Professor of Electrical Engineering, University of Kansas. 195 pp., 170 illus. Cloth binding. A practical guide to approved modern methods of lighting by electricity and of installing conductors for the transmission and utilization of electricity for power, lighting, heating and other uses. Price, postage paid, $1.00. MacLean Publishing Co., Ltd., 143-153 University Ave., Toronto.

A want ad. in this paper will bring replies from all parts of Canada.



No. 00

PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.

Threads Rods from ½ in. to 2 in., right or left.

American or Whitworth Threads.

Using the genuine Armstrong Dies.

All parts are interchangeable.

A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.

317 Knowlton Street
BRIDGEPORT, CONN.

WRITE FOR CATALOGUE

WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal

Williams Chain Pipe Tools

are guaranteed to provide for unusual service and you will never go wrong if equipped with them for any work in their line. No substitute ever has or will serve you as thoroughly and as often.

Improved "Vulcan"
Double Ended Reversible Jaws. "Two Tools in One at the Price of One" for Pipe Work.

"Agrippa"
with Single Jaw and Flat Chain, an excellent tool for close-quarters in Pipe and Fittings work.

Send for Pipe Tools Pamphlet

J. H. WILLIAMS & CO.
Superior Drop-Forgings
77 Richards St., Brooklyn, N.Y.

Branch Factory
Buffalo. N.Y.

T. H. SULLIVAN
PLUMBING
Steam and Hot Water Heating. Estimates Furnished. Fittings of all Kinds.

Logansport, Ind., March 3, 191 5.

Eddy Engineering Co.
Alpena Mich.

Dear Sirs-

Some six years ago I installed one of your systems for Mr. Melton and it has given so much satisfaction that he wants the same system in a new residence he is now building. Please send at once the price on a eleven or twelve radiator plant.

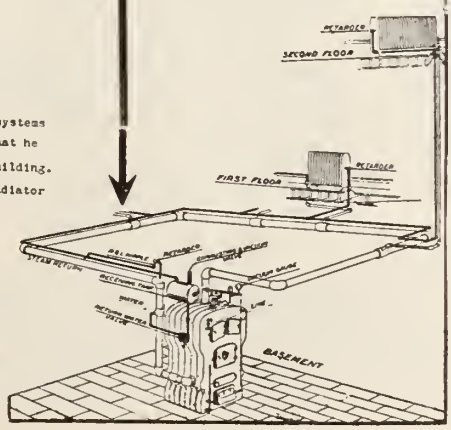
Yours Truly,
T.H.Sullivan.

Our folder K describes its operation and advantages.

Write for it.

EDDY ENGINEERING COMPANY
ALPENA, MICHIGAN, U.S.A.

Eddy
SYSTEM OF HEATING
"The Kind You Se ll Again"



THE "WANT" AD.

The "want ad." has grown from a little used force in business life into one of the great necessities of the present day.

Business men nowadays turn to the "want ad." as a matter of course for a hundred small services.

The "want ad." gets work for workers and workers for work.

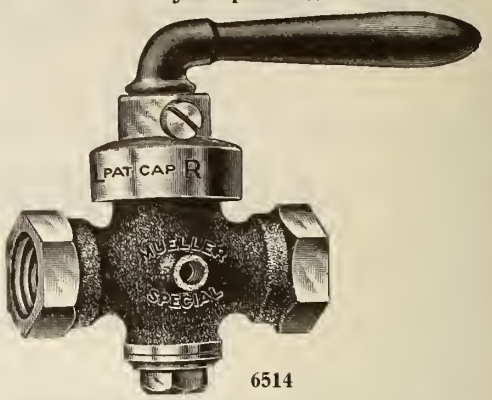
It gets clerks for employers and finds employers for clerks. It brings together buyer and seller, and enables them to do business though they may be thousands of miles apart.

The "want ad." is the great force in the small affairs and incidents of daily life.

Quality First—

A line of goods that has given the utmost of satisfaction. Quality shows in every ounce of metal. They are cocks you can depend on.

MUELLER No. 49
Ground Key Stop and Waste Cock.



The Famous Mueller 49

A ground key cock in use everywhere and always with the same result—good service and complete satisfaction. You will find this cock measuring up to every service requirement.

All Mueller Ground Key Work is given a test under 200 pounds hydraulic pressure, and is Unconditionally Guaranteed.

Clip and mail the coupon.

S.E.

H. Mueller Mfg. Co., Ltd.
Sarnia, Ont.
Send me your general catalogue and quote me prices on S. & W. Cocks.

Signed .....

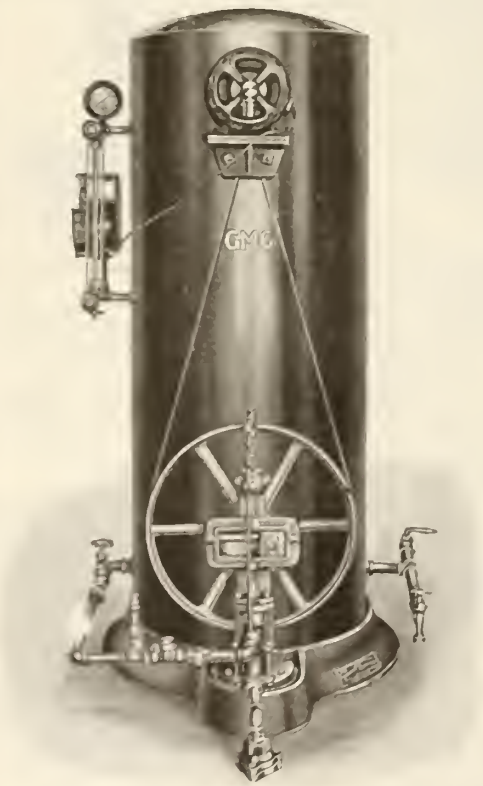
City .....Prov. .....

Made in Sarnia, Canada

H. Mueller Mfg. Co., Limited

SARNIA, ONT., CANADA

Makers of High-Grade Plumbing, Water and Gas Brass Goods.



G.M.C. Water Systems

The "G.M.C. Special" Nos. 21 and 22

Absolutely the best value ever offered in an Automatic Electric Water System.

Complete in every detail.

Two Capacities.
⅛ H.P.—100 Gal. per Hr.
¼ H.P.—200 Gal. per Hr.

Three Sizes of Tanks.
120 Gal., 220 Gal., 315 Gal.

These systems are furnished complete as shown—Shipped knocked-down—Can be installed by a competent man in one hour.

One Sale Means Another.

The General Machinery Co., Limited **22 Mulock Ave., Toronto**

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Jenkins Bros., Ltd., Montreal.
Kerr Engine Co., Ltd., Walkerville.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Aquarias.
A. F. Small, Toronto.

Asbestos Goods.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Boilers, Steam or Hot Water.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

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Standard Sanitary Mfg. Co., Toronto.
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C. A. Dunham Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Jenkins Bros., Ltd., Montreal.
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Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., London.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Cc
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Penberthy Injector Co., Ltd., Windsor, Ont.

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Cluff Mfg. Co., Toronto.
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H. L. Seymour.

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Galt Brass Mfg. Co., Galt.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
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Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
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Gurney Foundry Co., Ltd., Toronto.

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Gurney Foundry Co., Ltd., Toronto.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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P. Campbell & Co., St. John, N.B.

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Canadian Tube & Iron Co., Ltd., Montreal.
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Galt Brass Mfg. Co., Galt.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
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James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

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Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

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Anthes Foundry Co., Toronto and Winnipeg.
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Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

Porcelain Ware.
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Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

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Cluff Bros., Church St., Toronto.
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General Machinery Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
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Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn.

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C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves.
Galt Brass Mfg. Co., Galt.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.

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Hoyt Metal Co., Toronto.

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Kelly Engineering Co., Alpena, Mich.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.
The E. S. Manny Co., Montreal.
Penberthy Injector Co., Ltd., Windsor, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
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C. A. Dunham Co., Ltd., Toronto.

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Water Supply Systems.
Ashdown Hardware Co., Ltd., Winnipeg.
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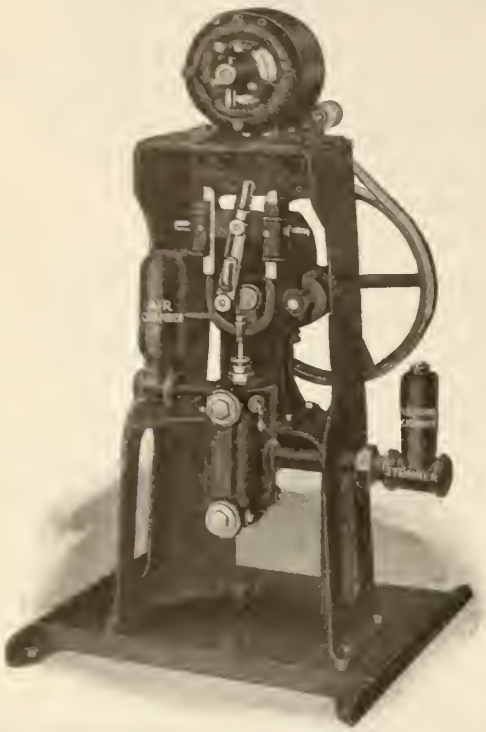
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
John Stevens & Co., Ltd., Winnipeg.

Stevens' Electric Motor Driven Pump



with Automatic Air Intake Valve for water supply systems, Double-Acting Pump—capacity, 275 gallons per hour.

SELF REGULATING. The automatic electric pressure switch regulates the stopping and starting of the motor and pump.

CONVENIENT DESIGN. In offering this model we claim a distinct superiority over any and all systems previously designed for this class of service. The motor and automatic switch are mounted above the pump, safe from contact with damp cellar walls and floors.

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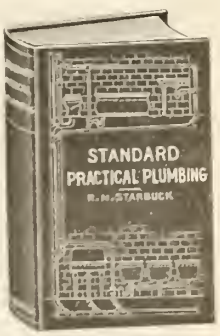

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"PERFECTO"
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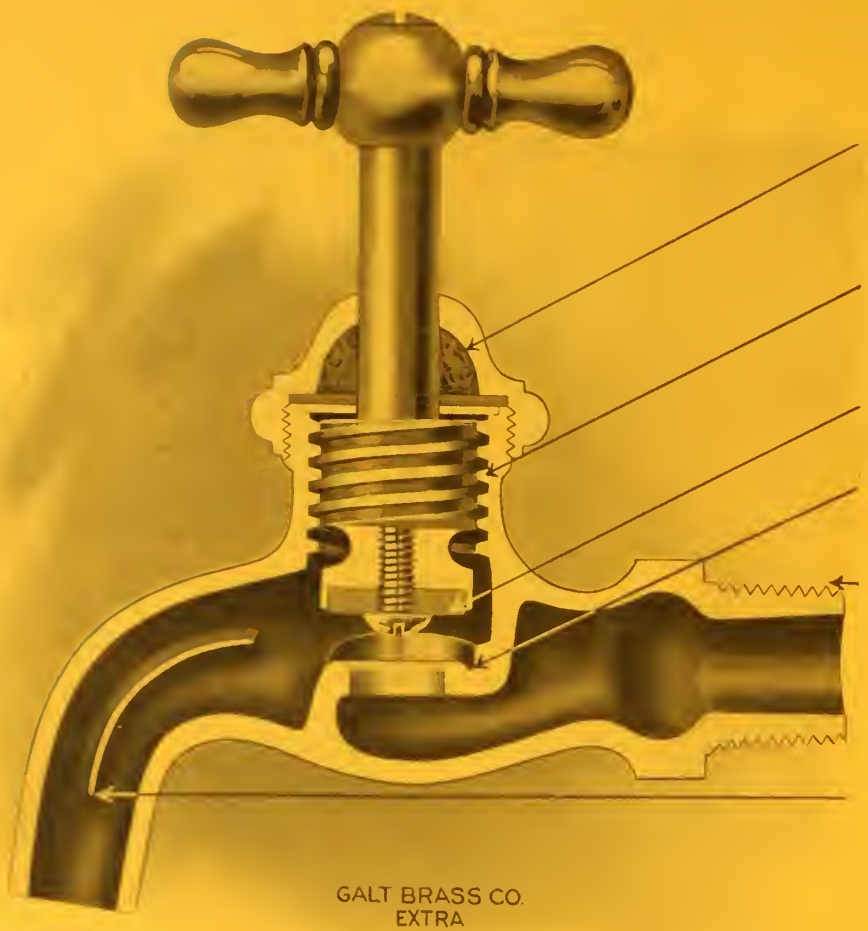

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Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX | Publication Office : TORONTO, JUNE 1, 1915 | No. 11

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Showrooms
Montreal - Toronto

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Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

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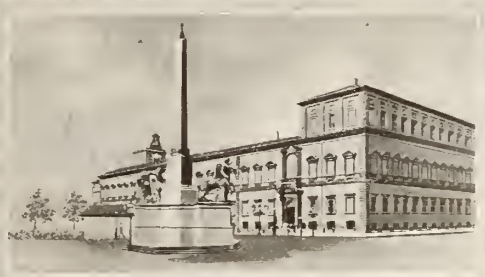

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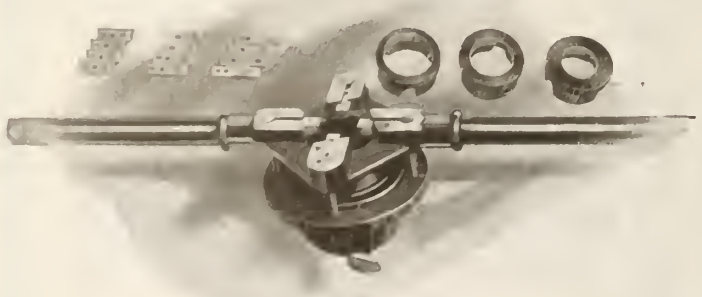
Do the very best work.
Do it in less time.
Cost you less for repairs.
They are the tools to buy.

Jardine No. 22 cuts 2½ in. to 4 in.



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Ask for our new Pipe Die Catalogue.

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Sole Makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.

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The Daisy Boiler

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1915 MODEL

MADE IN CANADA

Over 55,000 Daisy Boilers are in use at the present time. Every one is giving satisfactory service.

Easy to Install and Easy to Operate

They are economical in use and will be found to give the required heat with a minimum consumption of coal.

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Wouldn't an EXTRA Net Profit Look GOOD Right NOW?

HERE'S A WAY TO SAVE IT!

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An inefficient file is a time-killer. The time it *wastes* performing a piece of work would more than pay for a couple of *new* files.

By enforcing the shop-rule that no man must use an inefficient file, you save an EXTRA NET PROFIT that's "all velvet" for YOU.

To be sure you get MAXIMUM EFFICIENCY from your files use only the

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GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(MADE IN CANADA)

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Give them a trial in YOUR shop. Write for Catalog and "File Filosophy" TO-DAY.

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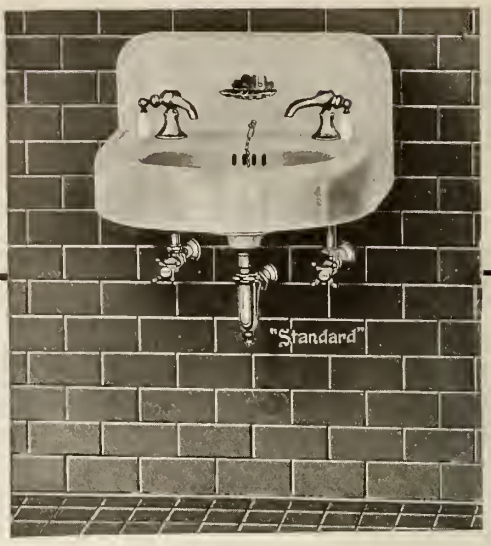

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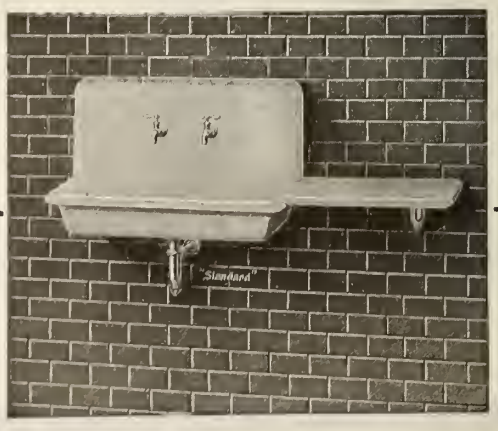

We Don't Ask You to Take Our Word for the Efficiency of the PRESTO HEATER. We Ask You to Judge by Actual Facts

Compare These Two Statements

PUBLIC WORKS, CANADA.

OFFICE OF THE SUPERINTENDENT OF BUILDINGS,

Montreal,... April 15th, 1913.

Harris Construction Co. Limited,
120, Sanguinet St,
Montreal.

Dear Sirs,

The attached is a copy of the accounts supplied by the Montreal Light, Heat & Power Company for steam furnished by the said Company during the winters 1911-1912, and 1912-1913, for the purpose of heating the Montreal General Post Office.

During the winter of 1911-1912, the old Building containing about 30,000 lineal ft of 1" pipe, was heated with Seven (7) 24" ** Heaters, and, the amount paid for the five months beginning November 1st to April 1st was : Two thousand Four Hundred and six dollars ($2,406.00)

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Hoping these facts will fully establish the merit of the "PRESTO" Heater,

I remain, dear Sirs,

Yours respectfully,

Overseer Public Works Dept

**Name of this firm will be given on request.

One heater cost **$8.00** per 100 ft. to heat the building.

The other heater cost **$3.92** per 100 ft. on the same job.

Which Heater Would YOU Take?

In this case THREE "Presto" Heaters (16") did more than double the work of SEVEN heaters of another make (24").

The "Presto" effected a saving of over 50%.

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Wolverine Tank Balls

—Guaranteed—

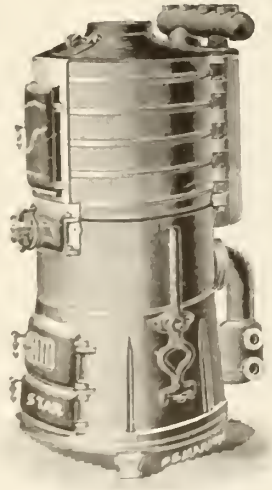
The ball with the reinforced top which makes elongation impossible.

Made of the finest rubber and will outwear three ordinary tank balls.

Our full line of Quality Rubber Goods are at your command, and if you want to give satisfaction all the time, use only Wolverine goods.

Canadian Wolverine Company
Limited
CHATHAM, ONT.

"MADE IN CANADA"



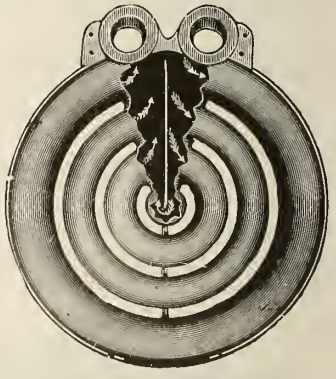
The quickest and most economical.

The "New Star"

Hot Water Heater

The most improved on the market. The only Heater having a *Tubular section* giving one-third more heating capacity than any Flat Section Heater, and dividing the water, making it easier heated.

Over 35,000 New Star Boilers in use, all giving entire satisfaction.



Section absolutely unbreakable.

Manufactured by

The Star Boiler & Radiator Company, Limited
New Premises: 1353 St. Lawrence Blv'd, MONTREAL

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The DUNHAM VAPOR SYSTEM of Heating

In Business Building:

The surest way to business success is to give your customer just what he wants; to last him as long as he expects and to do what he wants it to do.

In other words—sell him Service and Satisfaction.

The Dunham Vapor System comes nearer perfection than anything in the heating line. Why not investigate and find out "what's in it?"

If you decide you can do without the "Dunham" in your business and can satisfy your patrons better than the other fellow who is installing it, then "nuff sed."

But first let us talk it over and get both sides of the question straight before you.

Write us to-day and give us an opportunity of showing you the avenue to "better business."

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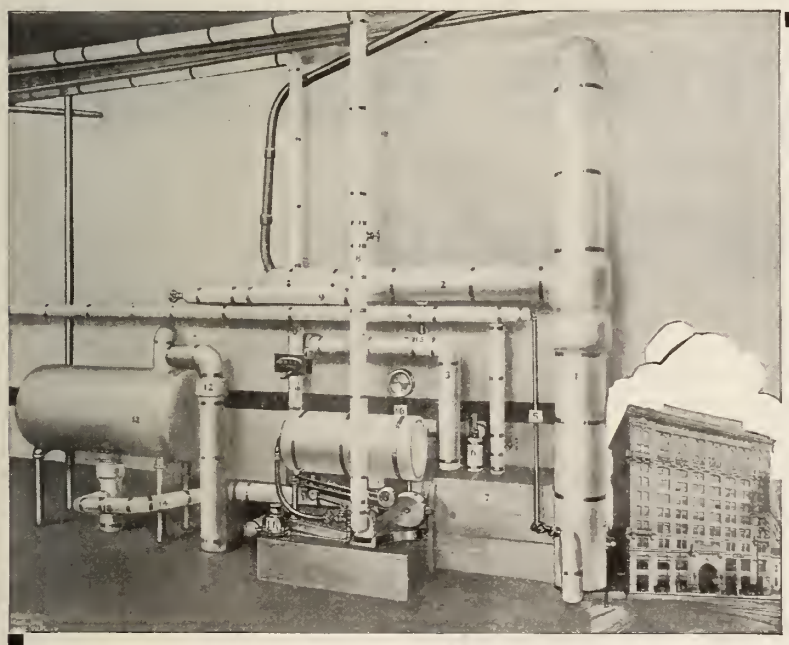

Typical installation in Security Mutual Life Building at Binghamton, N.Y.

CHIEF ENGINEER Asa P. Hyde writes that the Condenser Trap in this building is doing what they have never been able to do before

—CIRCULATE THE STEAM AND GET RESULTS.

Isn't that the kind of service you want *your customers* to have?

In This Handsome Building

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It is a matter of record that this installation of the

Morehead
Back to Boiler
SYSTEM

has not been touched with a wrench since the day it was put in.

This instance brings home the possibilities the "Morehead" System holds for wide-awake plumbers everywhere—not only in immediate **profit**, but in lasting **good-will**—the business man's most priceless asset.

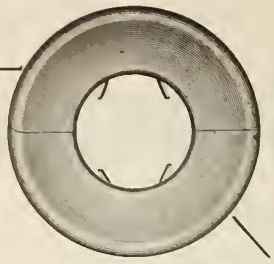
The "Morehead" Back-to-Boiler Book should be on your files. Write for FREE copy to-day.

Canadian Morehead Mfg. Co.

WOODSTOCK Dept. C. **ONTARIO**

OPEN VIEW NO. 10-A.

The CEILING PLATE that's better



TOP VIEW NO. 10-A.

THE NO. 10—A NARROW FLANGE PLATE IS A STEEL HINGED PLATE. FLANGES ¾" WIDE. HIGHLY FINISHED. ESPECIALLY DESIGNED FOR IRON CONNECTION.

The split ceiling plate is coming more and more into use than ever and ALWAYS GIVES A NICE FINISH, because it can be attached to mains and users at the very last, and is not exposed during completion of a building.

High quality at the right price.

GEM NO. 4

Gem No. 4 Automatic Air Valve

Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

Write for catalog showing our complete line of specialties.

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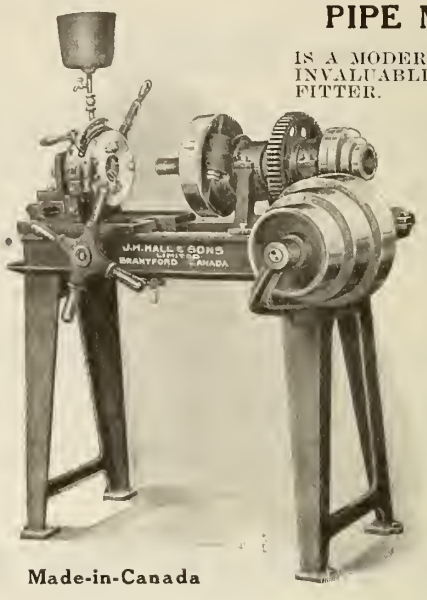
Save TIME and PIPE and CUT TRUE THREADS

THE HALL NO. 2 PIPE MACHINE

IS A MODERN TOOL THAT IS INVALUABLE TO THE PIPE FITTER.



Made-in-Canada

Built in Canada for a maximum amount of accurate and efficient service to Canadians, and they cost less than imported machines.

Capacity, ¼-in. to 2-in. pipe. Nipples, ¼-in. to 2-in. Bolts, ⅜-in. to 1½-in. Hand, Belt or Motor drive.

Only one of the many sizes manufactured by us.

Ask the user about Hall machines — we'll gladly furnish you with names.

Prompt delivery from stock.

JOHN H. HALL & SONS, Limited

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By H. K. Vosburgh — Revised by William Neubecker

This is a book of 135 pages, 54 plates.
Epitome of mensuration.
Mensuration of surfaces.
Tables, Rules and Recipes.
Practical Receipts, on the making of all kinds of solder.

The Most Practical "Helper" Ever Introduced Into The Tinshop.

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NO TROUBLE TANKS

BEAUTIFUL IN DESIGN. HANDSOME IN FINISH. UNEQUALLED IN SERVICE.

No joints to open up. No linings to leak. In fact, VitrOs that have seen over nine years of service are practically as good as new.

Each and every tank and its fittings are thoroughly tested under working pressure before leaving the factory—a VitrO Tank once installed, trouble has ceased.

OVER 200,000 NOW IN USE.

VITRO GUARANTEE

A new Tank will be given to replace one that at any time proves defective from either material or workmanship.

Sold By All Jobbers

Cluff Mfg. Co., Ltd.
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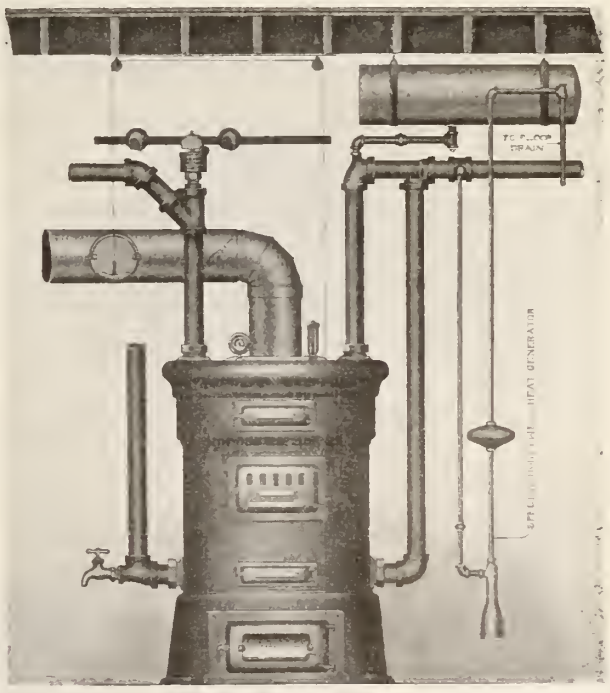
The Safe Way

For a long time there was only one Honeywell Tank-in-Basement system—the one in our building. Later there was another installation, then another and another, until now we do not count shipments singly—they are sold in quantities to the trade throughout the country.

The Honeywell Tank-in-Basement method of hot water heating is rapidly making friends — warm friends—with fitters who have experienced difficulty in locating expansion tanks above the radiation, or have had tanks freeze when so placed.

There is a reason for this growing demand for the Honeywell Tank-in-Basement method, due to the fact that it is absolutely safe and perfectly regulated. There is nothing about it to get out of adjustment, wear out, stick or give trouble in any way.

Honeywell Tank - in - Basement equipment is built *especially* for the purpose of enabling *you* to place the expansion tank in the basement — with safety—without trouble. We stand back of every job installed according to our instructions.



Write for catalog giving full description.

HONEYWELL HEATING SPECIALTY CO., Wabash, Indiana

SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO JUNE 1, 1915 No. 11

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EDITORIALS

Furnace Explosion—The Coming Convention—Start Right—A Question—The Metal Markets—Editorial Briefs.

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DIAMOND A BRAND — ASHDOWN'S GUARANTEE

SUPPLY SYSTEMS

WILL MAKE YOUR FARM HOME LOOK LIKE THIS

The installation of the Diamond "A" Hydro-Pneumatic Water Supply System allows farmers the convenience of a city water supply system in their own homes, and permits of modern and Sanitary plumbing fixtures such as Bath Tubs, Closets, Lavatories, Sinks, Laundry Tubs, as well as Range Boiler for hot water to the various fixtures. This system also affords fire protection to the home and the various adjoining buildings. The cost of Modern methods of manufacture is now so reduced that these systems may be installed cheap enough to be within reach of every up-to-date farmer. Write for our splendidly illustrated pamphlet which gives detailed description of modern farm home conveniences.

We furnish both hand and power outfits and carry in stock more than 100 kinds and sizes of hydro-pneumatic systems. Be fair to yourself, wife and family and enjoy the conveniences of the modern city home right on your own farm. For further information address

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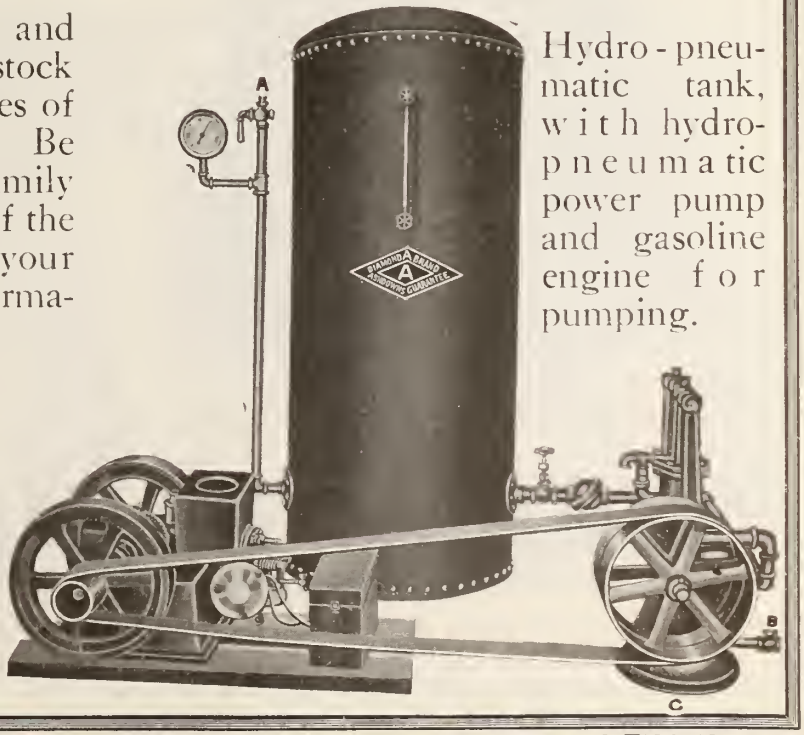

Hydro-pneumatic tank, with hydro-pneumatic power pump and gasoline engine for pumping.

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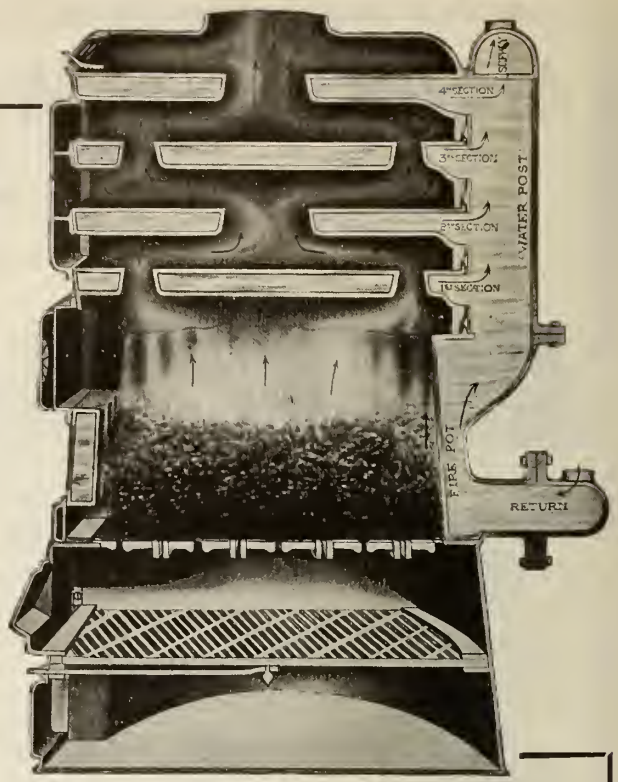
"Made in Canada"

Easier to Sell
Easier to Mount
Easier and Cheaper
to Operate.

Get our **"King Boiler Booklet"** and read it.



Sectional View "King" Boiler.

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THE SANITARY ENGINEER

VOL. IX. JUNE 1, 1915 No. 11

Explosion of Hot Water Furnace

Details of Explosion of Hot Water Furnace—A Newspaper Report, and Technical Paper Report—Note the Difference—The Sanitary Engineer has Been Advocating for Years that Heating Systems Should be Under Inspection of Practical Men.

FOR several years The Sanitary Engineer has advocated that all heating systems should be inspected and under the jurisdiction of the board of health, or some other efficient body of engineers. The reason for such inspection was to prevent in the first place, the jerry builder, from installing insufficient heating surface and boiler capacity and to ensure that an installation be properly constructed. It is common knowledge to almost every practical heating engineer, that anyone can instal his own system if he cares to, or he can buy his material and employ any one to instal it, irrespective of whether that person is a practical man or not.

In this issue we have to report a very serious explosion. The chief boiler inspector of the Ontario Government was called in to investigate, and reported to the Deputy Minister of Public Works as follows:—

Toronto, May 19, 1915.

Mr. R. P. Fairbairn,
Deputy Minister of Public Works,
Parliament Buildings,
Toronto, Ont.

Sir,—On May 17th at 11.06 a.m. a boiler explosion occurred at the residence of Mrs. C. R. Redfern, 14 Wells Hill crescent, Toronto, damaging the beautiful residence to the extent of about $5,000.

The boilers were of the ordinary round cast iron type, twin connected, with shut-off valves on the flow and returns, connected up in this manner so that each could be run independently. It was the custom to operate the smaller boiler during mild weather and to couple up the larger boiler during severe weather.

About a week previous to the accident, the valves on the flow and return of the boiler that exploded were closed and the fires allowed to go out. And on the day of the explosion, the maid finding that the house was chilly, commenced burning newspapers, which had accumulated during the winter, in the boiler that was isolated from the heating system. The burning of papers continued from 8 a.m. until the explosion occurred.

The maid stated that she heard a peculiar noise while charging the heater the last time and thought it was water dripping outside the cellar. Fortunately she had left the boiler-room and was upstairs when the rupture took place.

It will be easily seen what caused the boiler to explode. The valves being closed, the circulation was cut off and steam was generated with no means of of escape and it is impossible to estimate the amount of pressure that was exerted on the heater.

The shock was terrific and could be heard several blocks away. Every wall in the building was damaged and the floors in kitchen and dining-room completely wrecked. The walls up as high as the bath flat were pulled away from the dividing walls about four inches.

Fig. 1. shows boiler-room and location of boilers.

Fig. 2. shows damage done to kitchen.

Fig. 3 shows damage done to dining-room.

This installation was the ordinary hot-water, house-heating apparatus over which we have no jurisdiction. And even if it had been under our supervision, a rigid inspection could not have prevented such an accident, because it was entirely up to the operator. I am of opinion, however, that if the expansion pipe had been

The views shown in this article are by the courtesy of The Ontario Boiler Inspection Dept., Toronto.

Fig. 1. Boiler room situated in basement. Twin boilers the one on the right exploded wrecking the other.

connected to the water posts between the boilers and stop valves that this accident would not have occurred, unless this expansion pipe had also been fitted with a shut-off valve. I am further of the opinion that a safety valve of sufficient area to release excessive pressure should be fitted to boilers of all descriptions, as with this device in proper working order it would have released the excessive steam pressure.

I have the honor to be, sir,
Your obedient servant,
D. M. MEDCALF,
Chief Inspector of Steam Boilers.

Here was a hot water heating system installed, requiring two boilers to heat the house. These boilers were twin connected with gate valves or feed and return. Because of the mild weather the valves on one of the boilers had been turned off, and a fire put on it. It transpired that no expansion pipe was directly connected to that particular boiler. This condition had been brought about by men getting into the habit of taking a branch off the nearest return pipe and connecting the expansion tank to it. Such a practice should be discontinued. No expansion pipe should be thus connected where two boilers are connected together.

The greatest expansion of water takes place at the boiler, therefore, it should be relieved at its source. Had the practice of connecting the expansion pipe to the feed, or return at the boiler, between the valves and boiler, been followed, this accident would not have happened. Without doubt there are scores of twin boilers to-day in the same condition as the one we are discussing. Fig. 4 shows how such an accident could have been prevented. One or two heating men we know, have suggested that valves on the feed and return are not necessary. We maintain that they are necessary, in case one boiler requires any repairs; the valves would be worth all they cost. Twin boilers require valves, but not necessarily to turn-off so as to cut one boiler off while the other is in operation. The small amount of heat loss would never be noticed, especially if the draft doors and all other openings on the idle boiler were kept closed.

Such valves are not to close off as was done in this case. At the same time we maintain that a boiler should have the expansion pipe in direct connection with the boiler, with no valves on. The expansion pipe is the safety valve of a hot water system.

No practical heating engineer would ever dream of putting a valve in between a steam boiler and the safety valve, therefore, no valves should be on any line of piping which would be apt to close off the only means of expansion.

Fig. 2 Showing damage done to kitchen, wrecking gas stove, etc.

A TRADE PAPER REPORT

Explosion of Hot Water Furnace

Toronto, May 17.—The explosion of one of a pair of hot water boilers occurred in the home of Mr. C. R. Redfern, 14 Wells Hill Crescent, Toronto, yesterday, causing upwards of $5,000 damage. Fig. 1, 2, and 3 gives some idea of the seriousness which attended such an explosion.

The occupants of the house it will be seen had a most miraculous escape, there being no one hurt in the least. Apart from the damage shown, the rear walls of the house are bulged out and they will have to be pulled down and rebuilt. The wonder is that there are not more accidents of this kind. If the public knew, and they should know, that they are risking their lives every day because of conditions that exist such as caused this explosion measures would doubtless soon be taken to remedy such conditions.

This explosion was caused by the heating system not being properly installed. The system was a pair of hot water furnaces connected together, valves being placed on both furnaces, feed and returns. The valves on one furnace were closed, so that one furnace only might be used when the weather was milder. It transpired that the maid began to burn paper in the furnace which had the valves closed, and on account of the boilers not being properly fitted up with the necessary expansion pipes, of course it exploded; nothing more natural.

But why were these summer boilers not furnished with proper provision to take care of expansion? There are two reasons:—1st, Because any irresponsible man who can cut and thread a pipe is allowed to instal a heating system in Canada. 2nd, Because there is no proper inspection of house heating systems, as there should be. We strongly advise that every person residing in a house, where there are two furnaces connected together should call in a practical heating engineer to inspect, and guarantee that such an explosion will not occur with their furnace, whether valves are turned off or not.

It is a very simple matter to those who know their business, and only the most careless person, or impractical man could make such a blunder as that which resulted in the bursting of the boiler referred to.

MASSACHUSETTS WANTS TO REGULATE HEATING ENGINEERS.

The committee on mercantile affairs on the Massachusetts Legislature has before it for consideration a bill providing for the examination and licensing of steam fitters in much the same manner as plumbers are now examined and licensed, which is attracting considerable attention. The bill is very generally favored by the craft and not much opposition is expected when it comes up for a hearing. The committee has as yet set no definite date for a hearing. The bill reads as follows:

An Act to Regulate the Installation of Heat, Power and Ammonia Systems.

Be it enacted by the Senate and House Representatives in General Court assembled, and by the authority of the same, as follows:

Section 1.—It shall be unlawful for any person, firm, association or corpora-

A Newspaper Report.

VALVES TURNED OFF

Maid Lit Furnace and Forgot to Turn Them On

Toronto, May 17.—An investigation into the cause of the explosion in the furnace boiler of Mr. C. R. Redfern's house at No. 14 Wells Hill crescent yesterday, has revealed the fact that the explosion was caused by the maid lighting a fire in the furnace when the valves connecting the furnace and boiler were turned off. The valves had been turned off when the furnace went out during the hot weather at the last of the week. Yesterday the maid lit the fire and forgot that the valves were turned off. A tremendous pressure was created and the boiler burst and caused $5,000 damage, very little of which was covered by insurance.

Mr. J. R. McNichol, of the Dominion Radiator Co., said this accident would have been prevented had the boiler been equipped with a safety valve appliance. He claims the leading manufacturers of the hot water appliances have long advocated that the city should inspect all hot water installations and force all to be equipped with safety valves, because without this appliance, serious accidents are sure to result.

Insurance companies do not include losses of this sort in their policies, and pay only for damage arising from accompanying fires.

Fig. 3. Dining room floor torn up, furniture wrecked, etc.

tion or any agent thereof, to enter into, engage in, or perform any work pertaining to the installation of any steam, hot water, vacuum, vapor or ammonia system, or power plants, except as hereinafter provided, unless duly licensed according to the provisions of this act.

Section 2.—No person, firm, association, corporation or agent thereof, shall employ any person to perform such work who is not licensed as aforesaid, except as hereinafter provided.

Section 3.—All persons engaging in the work hereinafter described shall first make application for examination therein to the state board of examiners who shall be established in accordance with this act; such application must conform to the requirements of the rules or regulations to be established by said board; such rules or regulations shall be designed to insure safety and health, and the board shall diligently examine all applicants for licenses to perform the work herein before mentioned, both orally and in writing, to determine their qualifications.

Section 4.—The state board of examiners shall consist of three members, one of whom shall be the state inspector of heating, power and ammonia plants, one shall be an employer having three years' actual experience in the installation of the work comprehended in this act, and one a journeyman of at least five years' experience in such installation. The members of the board shall be appointed by the chief of the district police. One member who shall be the secretary of the board, and shall also act as first examiner thereof, shall be appointed for a term of three years, one for two years and one for one year, and at the expiration of the term of office of each member of the first or original board every new appointment made to said board shall be for a term of three years. The board shall hold examinations at such times and places as in their judgment seems best for the greatest convenience and economy both to the commonwealth and to the applicants for licenses.

Section 5.—It shall be the duty of the board of examiners to keep a complete record, accessible to the public, of all their proceedings and examinations, with the name, residence, place of business, and the results of the examination of the applicants.

Section 6.—The secretary of the board shall receive a salary of twenty-five hundred dollars a year and the other two members of the board shall receive ten dollars for each day of actual service upon the board, but not over five hundred dollars a year each. The board may make such other expenditures and incur such expenses as shall be approved by the chief of the district police, subject also to the approval of the governor and council.

Section 7.—A fee of five dollars shall accompany each application for a master's license and a fee of three dollars shall accompany each application for a journeyman's license, and shall be forfeited to the department, whether the applicant is successful in passing the examination or not. All fees received by the board shall be paid over by the secretary thereof to the treasurer of the commonwealth each month.

Section 8.—In the event of failure to pass an examination no application for another examination shall be entertained for a period of six months.

Section 9.—Any person holding a license under this act shall display it upon demand. The license shall be renewed annually upon the payment of three dollars; the money so obtained shall be paid to the treasurer of the commonwealth as aforesaid.

Section 10.—All persons who can satisfy the state board of examiners that they have had at least five years' actual experience as journeymen in the kind of work comprehended by this act, shall be given a license by said board without examination. Licenses of this kind shall be designated as Form No. 1, and licenses that are obtained by examination shall be designated as Form No. 2.

Section 11.—Revocation of license. The state board of examiners shall have

(Continued on page 18.)

Top picture presents a good view of the harbor at St. John, N.B. This is one of Canada's finest shelters. Bottom picture shows a slip of the harbor at high water.

The above is a view of a harbor slip at low water. Note the boats on dry land.

St. John, N.B. Convention City

A Short Historic Sketch of Canada's Great All Year Round Port—Every Member of the Association Who Can See His Way Clear Should be Present at the Coming Convention.

SAINT JOHN, a city of some 60,000 people occupies a picturesque position on a rock ribbed peninsula at the mouth of the Saint John River, overlooking the Bay of Fundy. Standing on the heights of Fort Howe the beholder gazes upon a picturesque panorama of river, bay and green embowered hills and vales. To the left may be seen Red Head peninsula, and farther on Partridge Island, beyond which is the entrance to the harbor, and the faint outlines of the Province of Nova Scotia. To the right flows the historic Saint John River, 450 miles long, at the mouth of which its waters meet the Bay of Fundy tides twice every twenty-four hours, presenting the unique spectacle of the waters of the river running toward its source. Across the river is the Town of Fairville with its factories, pulp and lumber mills, and on the other side of the harbor West Saint John, once the Town of Carleton, named after Sir Guy Carleton, the first Governor of the Province—with its wharves and elevators, docks, and river road leading toward "Courtenay Hill," past Fort Dufferin, Martello Tower, Seaside Park and "Smuggler's Cove," which latter, legend says, was a favorite haunt in the 18th century of those who flew the pirate flag of stream and ocean commerce.

The years from June 24, 1604, the day that Champlain, DeMonts and Poutrincourt landed where now is "Market Slip," replacing the emblems of Membertou with the Lilies of France, and naming the river, which their daring had discovered, Saint John, in honor of Saint John the Baptist, whose festal day it was, to the coming of the 3,000 Loyalist emigrants on May 18, 1783, was but the prelude to the more persistent courage, and wiser self-sacrifice of the men and women who builded Saint John, and laid the foundations for the future growth and expansion of the Province of which it is such an important part.

G. S. DORMAN, Moncton, N.B., President, Canadian Society of Sanitary and Heating Engineers.

Following the departure of Champlain and his ships the country remained in the possession of the Micmacs for many years. In 1631 Fort LaTour was built at the mouth of the Saint John River by Sieur Charles LaTour, whose name has been made historic not only by his own exploits, but also by the dauntless daring of Lady LaTour who, in the absence of her husband, defended the fort more than once against the attacks of D'Aulnay Charnisay his rival, and who like LaTour was a governor of a part of Acadia. Finally overcome by treachery and superior numbers her garrison was put to death and she was made a prisoner, to die a broken hearted woman, with a record for intrepid courage which will live for all time in the annals of Acadian history.

The years passed by. D'Aulnay was drowned. LaTour emerging from obscurity, went to France, had the charges against himself annulled, married

D'Aulnay's widow and returned as governor of Acadia, only to meet years later the fate of his former rival. One governor followed another. Acadia was taken by the English to be returned to the French by the Treaty of Breda in 1667. Villebon, whose remains lie buried in Carleton, dismantled Fort La Tour in 1700; and it was not until 1749 that Boisherbert raised the flag of France once more over its ramparts, only to have it taken down in 1758 by the British, to be replaced by the Union Jack. The fort was rebuilt, and called Fort Frederick. A blockhouse was also erected on the heights, later called Fort Howe. New England colonists established fisheries along the river. With the years other settlers followed. But it was not until May 18, 1783, when 3,000 Loyalist emigrants landed at the same spot where Champlain had moored his ships 179 years before, that the permanent foundations of the city were laid. It was another Plymouth to these hardy pioneers, and fraught with consequences as momentous and great. History records few such acts of determined patriotism. They had resisted rebellion against the Mother Country in the thirteen revolting American colonies, and when the latter had achieved their independence, gave up their all to come to the wilderness in order to maintain their allegiance to Britain's crown.

The courageous daring of these pioneers was the earnest of a great city to be. It hewed down the forest, builded homes, and laid out its streets. It established laws and enforced them. It raised the foundations again and again upon the ruins of devouring flames; and when the great fire of June 20, 1877, destroyed $22,000,000 of property and rendered 13,000 people homeless, it was this same spirit reincarnated in their descendants, that housed the homeless, fed the hungry, and on the dead ashes of a past glory reared anew a city, which has grown in the last thirty years to one of the most important in the Dominion.

Canada's Winter Port.

It became Canada's great winter port

GEO. E. BLAKE, St. John, Chairman of Entertainment Committee at the coming convention.

in 1895. Its trade has expanded, and today the ships which moor in its harbor carry more than $31,000,000 of exports to all parts of the world. Large factories have taken the place of the early wooden shipbuilding plants, and they employ between five and six thousand people, paying close to $3,000,000 yearly in wages. It has a magnificent harbor, which it is rapidly improving. It is the terminal for two great railroad trunk lines, and in a short time two others will follow, connecting it by rail to all parts of the Dominion and the United States, which latter country is already exporting products amounting to nearly $7,000,000 through its harbor to foreign shores.

The past year has seen an unparalleled real estate expansion and growth in building amounting to nearly $2,500,000; a per capita growth greater than that of any other Canadian city.

It is one of the largest distributing centres in Canada. No Canadian city has better water and a more healthy climate. It has the smallest per capita debt of any city in the Dominion. Its population less than 50,000 at the last census, has increased to more than 60,000. It is the metropolis of New Brunswick, one of the two large cities in the Maritime Provinces, and the Dominion's leading winter port; a position it is bound to hold not only because of the vast producing territory to the north and west, but also because of its superior location on the trade routes of the world.

Public Schools.

The city has a highly efficient system of public instruction. All schools in the system are supported by public taxation. The schools are governed by a Board of Trustees composed of eleven members, nine men and two women, five of whom, including one woman with the chairman, are appointed by the Lieutenant Governor-in-Council, and the other six by the City Council. They appoint the superintendent, secretary, teachers, and other employees. They arrange for school accommodations, purchase and lease land for new buildings, provide maps, apparatus and furniture for the schools, and borrow money, besides exercising other powers, subject to the conditions laid down in the Provincial School Act.

Shipping and Transportation.

Possessing unsurpassed shipping and transportation facilities by land and water, situated contiguous to the great lumber and coal producing sections of this and neighboring provinces, and the natural market for one of the most fertile agricultural regions in Canada, Saint John is the largest industrial centre in New Brunswick, and one of the most important in Canada.

The greatest factor in this development for many years has been the lumbering industry supplied by the forest product of the territory drained by the Saint John River, 450 miles long, and its

Queen's Square, St. John, N.B., which is a popular part of the city in the spring and summer months.

tributaries. It is estimated at the present time that about 125,000,000 feet of lumber is floated down the river to Saint John yearly, and manufactured into lumber and wood pulp.

Foundry, Machine Shop Products.

The manufacture of iron prodnets has also of late years assumed large proportions, in the production of which some of the city's most important industries are engaged. Of these the largest producing plant is that of T. McAvity & Sons, Limited, the foundation of which was laid as early as 1837 by Thomas McAvity. The company is the owner of the Vulean Iron Works, employing eighty people, and manufacturing iron castings of all kinds and a brass works which employs two hundred and fifty persons who produce brass goods, valves, pipe and pump fittings, for steamfitters, plumbers and locomotive manufacturers, being the largest brass goods makers in Canada. For storing goods, four warehouses containing some 82,200 square feet are utilized, besides a five-storey building 36 x 100 feet, which is used as a retail and wholesale store, where some seventy more people are employed in the sale of their product, which extends throughout the Dominion. They employ eight travelers, besides conducting a branch at Winnipeg, and in all do a business of more than $1,000,000 annually.

Plumbing Supply House.

The large supply house of the James Robertson Co., Ltd., of Montreal, has had a branch establishment in Saint John for thirty-six years.

The business occupies premises 200 by 75 feet, on which are located the brass foundry and lead pipe factory, besides warehouse and office, for the manufacture of lead pipes, brass goods and plumbers' supplies, while making it also the distributing plant for lead traps, babbit metal, steam fitters', engineer, mill, and plumbers' supplies for the Maritime Provinces and Newfoundland.

Sewerage.

The natural conformation of the land on which the city is built is such, that all sewerage is easily disposed of without artificial aids. From every side of the city the sewers naturally incline at an acute angle towards the harbor, from where all refuse is carried twice a day by the outgoing tide of the ocean.

The city has over forty-three miles of sewers valued at $544,000 with 1,053 inlets. During 1913, 8,384 feet of new main sewers were laid at a cost of $20,-050.84. Moreover, three and one-half miles have been renewed during the past three years, and this policy of renewing old sewers will be continued, the expense being paid from the current account.

Under R. W. Wigmore's administration of the water and sewerage department, the value of the waterworks, including renewals, has increased $8,000, and the sewerage works $15,000; while the cost of repairs has decreased $15,-000, and expenses $4,000, notwithstanding the fact that the cost of labor and material has increased.

MASSACHUSETTS WANTS TO REGULATE HEATING ENGINEERS.

(Continued from page 15.)

the power to revoke any journeyman or employing fitter's license if same was obtained through error or fraud, or if the recipient thereof, is shown to be grossly incompetent, and for second wilful violation of any rules and regulations prescribed by the state board of examiners. The state board of examiners also have power to revoke any heating contractor's license if the owner thereof shall be guilty of a second wilful violation of any rule or regulation prescribed by the state board of examiners; provided that before any license shall be revoked the holder shall have notice in writing enumerating the charges and at a specified date named therein, not less than five days after the service of such notice, be given a hearing by said board and have an opportunity to produce testimony on his behalf. The state board of examiners shall have power to appoint, by an order in writing, its secretary or any competent person to take testimony, who shall have power to administer oaths, issue subpoena and compel the attendance of witnesses, and the decision of the state board of examiners shall be based on its examination of all testimony and records. Any person whose license has been revoked may after the expiration of one year from date of such revocation, apply for a new license.

Section 12.—The state board of examiners shall have the power to appoint, subject to the approval of the governor and council, such inspectors, stenographie and clerical assistance as they may deem necessary. The salaries of such employees shall be fixed by the chief of the district police with the approval of the governor and council.

Section 13.—Any person who shall engage in the work of master or a journeyman fitter for compensation with a permit or license as provided in sections one to twelve inclusive of this act shall be deemed guilty of a misdemeanor and shall be subject to a fine of not less than ten dollars nor exceeding fifty dollars, or imprisonment in the country jail not exceeding thirty days for each and every violation thereof. Each day of such violation shall constitute a separate offense.

Section 14.—The term "journeyman" as used in this act shall mean one who has been employed actively in performing the work contemplated herein, for a period of at least five years. The provisions of this act in so far as they refer to plants shall embrace all kinds of piping necessary to such plants and through which passes hot water for heating purposes, steam for heating or power purposes, air for vacuum, heating or refrigerating purposes, water for power hydraulics and all refrigerating piping.

Section 15.—This act shall take effect upon its passage.

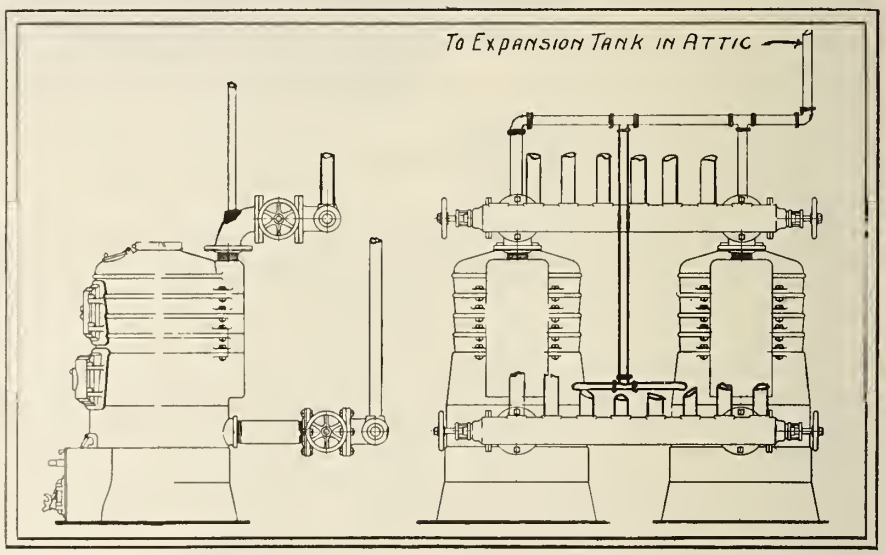

Fig. 4

Safe method of connection required to allow expansion on twinned hot water furnaces.

TO ERECT CANADIAN PLANT.

The Good Manufacturing Co., 303 East 134 street, New York, are contemplating starting a made-in-Canada organization for their goods, and are expected shortly to commence the erection of a plant at Niagara Falls, Ont.

Proposed Provincial Plumbing By-law

Being a By-law Proposed by the Ontario Society of Domestic, Sanitary and Heating Engineers, and Approved by Them. The Provincial Board of Health Have it Before Them for Further Consideration.

For Plumbing Construction and House Drainage.

THE first 37 clauses of this proposed by-law appeared in the May 15 issue of the Sanitary Engineer. Full and free discussion through these pages would be welcomed, with a view of getting a variety of opinions upon it.

Editor.

CLAUSE 38.—All cast iron pipes used for soil waste and vent pipes shall not weigh less than the following specified weights per lineal foot and shall be sound, cylindrical and smooth, thoroughly coated inside and outside with linseed oil or tar, or such other coating as the Local Board from time to time may approve of:

Diameter of pipe.	Weight per lineal ft.
2 inches	4 lbs.
3 "	6 "
4 "	9 "
5 "	17 "
6 "	20 "
7 "	27 "
8 "	33½ "
10 "	45 "

CLAUSE 39.—Wrought iron or steel pipes shall be galvanized inside and outside, with smooth interior, and shall not weigh less than the following specified weights per lineal foot:

Diameter of pipe.	Weight per lineal ft.
1¼ inches	2.24 lbs.
1½ "	2.68 "
2 "	3.61 "
2½ "	5.74 "
3 "	7.54 "
3½ "	9.00 "
4 "	10.66 "
4½ "	12.49 "
5 "	14.50 "
6 "	18.76 "

CLAUSE 40.–Lead pipe used for branch soil, waste, vent, or flush pipes shall be of the best quality drawn pipe and shall not weigh less than the following specified weights per lineal yard:

Diameter of pipe.	Weight per lineal yd.
1¼ inches	7 lbs.
1½ "	9 "
2 "	12 "
3 "	18 "
4 "	24 "

CLAUSE 41.—Lead bends and lead traps for water closets, slop sinks and urinals shall not be less than ⅛ of an inch in thickness. All other lead traps shall correspond in weight and quality to the lead waste pipe to which they are attached.

CLAUSE 42.—Brass pipe for soil, waste or vent pipes shall be thoroughly annealed, seamless drawn or brazed tubing, having not less than the following specified outside diameter, weight and gauge:

Outside dia. of pipe.	Weight per lineal ft.	Dr. Imp. wire gauge.
1¼ inches	0.88 lbs.	16
1½ "	1.06 "	16
2 "	1.54 "	16
2½ "	2.82 "	12
3 "	3.41 "	12
4 "	5.74 "	10

FITTINGS.

CLAUSE 43.—All fittings shall correspond in weight and quality with the pipes to which they are attached. Special fittings not provided for in these regulations but approved of by the Plumbing Inspector may be used in any part of the system.

CLAUSE 44.—No connection to any drain, soil or waste pipe shall be made by boring or tapping the pipes or by a saddle, and no inverted joint shall be used below any fixture.

CLAUSE 45.—No pipe hub shall be used as an increaser. Increasing or reducing in size must be made with a proper fitting.

CLAUSE 46.—The arrangement of drain, soil, waste and vent pipes shall be as direct as possible, and all horizontal pipes shall be run on a uniform grade of ½ inch to the foot where possible, but in no case should the grade be less than ¼ inch to the foot.

CLAUSE 47.—All changes in direction of horizontal pipes shall be made with full "Y" branches and 1-6, ⅛ or 1-16 bends. T-Y's may be used on vertical soil and waste lines when it is impossible to use a "Y" branch, but are prohibited on horizontal lines.

CLAUSE 48.—¼ bends may be used on the vent system, fresh air inlets, rainwater leaders, or floor and yard drains. T'S may be used on the vent system.

CLAUSE 49.—No double hub or double T-Y shall be used on horizontal runs, nor shall double hubs, straight crosses or T-Y with side branches be used on soil or waste pipes.

TRAPS.

CLAUSE 50.—Every fixture shall be separately and effectually trapped by a self-cleansing water-sealed trap placed as close to the outlet of the fixture as possible, but in no case shall it be more than 12 inches from such outlet.

CLAUSE 51.—All traps shall have a water seal of at least 2 inches and be set to their true level.

CLAUSE 52.—No mechanical form of trap which depends on movable parts or concealed interior partitions for maintaining its seal will be allowed.

CLAUSE 53.—There shall only be one trap under a water closet, and that immediately beneath same.

CLAUSE 54.—No fixture shall drain through more than one trap, main trap on house drain excepted.

CLAUSE 55.—Traps shall not be less than the size of the waste to which they are attached and equal in quality and thickness.

CLAUSE 56.—All traps, where practical, shall have watertight cleanout screws, except earthenware traps, and be so located as to be easily accessible.

CLAUSE 57.—Special form of traps, such as grease, sand and other traps not herein provided for, shall be approved and installed under the supervision of the Plumbing Inspector whenever called for by the regulations of the Local Board.

CLAUSE 58.—Vent horns on earthenware traps are prohibited.

VENTS.

CLAUSE 59.—The trap of every fixture, except where such fixture is the highest fixture on the main soil pipe and is not more than 2 feet from such main soil pipe, shall be protected from syphonage and back pressure by an anti-syphon or vent pipe which shall, where possible, be constructed on the continuous waste and vent principle: the inlet of such traps shall not be more than 15 inches from such continuous waste and vent, and where such is impracticable, the vent shall be taken off the waste pipe at least 3 inches and not more than 6 inches from the crown of the trap, and shall be connected to branch vent at least 6 inches above the top of fixture.

CLAUSE 60.—All main vents shall connect at their base with the main soil or waste pipe below the lowest fixture in such a manner as to prevent the accumulation of rust scale and shall be extended through the roof and fastened as per section, or may re-connect to the main soil pipe at a point at least 6 inches above the highest fixture connected therewith.

(Continued on page 27.)

The Sanitary Engineer

Plumber and Steamfitter of Canada

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Circulating amongst Sanitary, Heating and Ventilating Engineers, Gas Fitters, Sanitary Inspectors, City Engineers, Boards of Health, Architects, etc.

TORONTO, JUNE 1, 1915

Furnace Explosion

AGAIN we are confronted with a case which proves our repeated assertions that all heating of buildings should be under the jurisdiction of some practical body.

For almost two years The Sanitary Engineer has been advocating that the boards of health should be held responsible for the proper installation of heating systems. As far back as November, 1913, The Sanitary Engineer planned out a scheme showing that all manner of domestic, sanitary, heating and ventilating engineering should be under the jurisdiction of a federal department of health.

These problems are far too important for one city, or province to handle. We pointed out at that time that the only measure which could be a benefit to Canadian citizens would be a federal department of health and we still maintain the same opinion. Here are a few of the many things which none but a federal body could handle in a proper and efficient manner.

Non-pollution of waterways.

Procuring of pure water supplies for municipalities.

Uniform sanitary engineering code of by-laws.

Experimental stations under federal control.

Boards of examiners, who should examine and grant licenses of competency to all sanitary and heating engineers.

Appoint a board of heating and ventilation engineers.

We sincerely hope that every member of the craft throughout Canada will give these matters some thought. In our next issue we will explain further why we think such a federal department of health is so essential to the future welfare of the public as well as of the craft.

Start Right

NINETY per cent. of the failures in all businesses or professions can be traced to the undertaking not having been started on right lines.

The problem of price-cutting is directly traceable to a wrong start, to a wrong conception of honest business methods.

For instance, when price-cutting is resorted to, some one is going to suffer, and often more persons suffer than those who have done the cutting.

If our readers will look around and note the standing of those firms who have been in business for a long period of years, they will find that one of the main characteristics of these old established businesses has been, that they made their start right—that they did not cut prices.

On another page will be found an article which appeared in Hardware and Metal, one of The MacLean Publishing Company's 14 papers, 20 years ago, and in this article a story is told how one of the most prosperous sanitary and heating concerns in Canada was built up—a concern which to-day holds a reputation second to none in Canada—that of the John Ritchie Co., Ltd., Adelaide St. East, Toronto.

The Coming National Convention

ANOTHER year has passed since the last National Convention took place in Ottawa. What has the trade done during the past year? Can any of our readers look back on it with pride? We are sure they can. In the North-West great strides have been made. New standards have been adopted. Various changes in soil pipe fittings have been made. Quite a large number of members of the craft have been appointed to positions on their local boards of health.

Several towns and cities have remodelled their plumbing ordinances, and by-laws have been amended in places which now require all journeymen as well as employers to pass an examination proving their practical abilities before being granted licenses.

All these improvements are and have been brought about by those members of the craft who are always on hand at their trade conventions. Those who do not belong to these various associations are reaping the benefits of hard work done by those members. All such conventions cost time and money. The more members the lighter the load individually. The next convention, as has been reported in several recent issues of The Sanitary Engineer, is to be held in St. John, N.B. The place of meeting is:

McLaughlin's Building, 140 Union St., St. John, N.B.

The following members of the association are acting as entertainment committee:

Geo. E. Blake, St. John, Chairman; F. Noble. F. S. Walker, W. C. Crawford. W. E. Emerson, R. E. Fitzgerald. L. H. Estano, Moncton, Secretary-Treasurer.

Those who have met the above named gentlemen at past conventions will agree with us when we say that there can be no doubt as to the entertainment being a success, and those same members are also earnest workers for the trade all through. It is to be hoped that a goodly number will be in attendance and in that way make the coming convention a success. Conventions, on the face of them, do not seem to be as great a success as they really are, yet there is a something connected with them which makes every earnest member of the craft feel that he should be present.

Under Heading of New Business

AT almost every important business meeting there is something to be done under the heading of new business.

What are sanitary and heating engineers doing under this heading?

Some we know are busier just now because they have launched out after business. And, we do not know of one, who is busy, that has waited for the work to turn up.

In the past most business which has come to the craft, has not been worth the time spent upon it. The proof of our assertion is in the fact that so few sanitary and heating engineers are what one may term "on easy street."

Look over the advertising pages of The Sanitary Engineer and note how manufacturers and supply men have kept up their advertising. They know that to be ever at the fore, one must keep in the limelight. Look up other lines of business and see how the advertising is kept up. Manufacturers in our line are willing, yea, anxious to furnish all kinds of cuts and half-tones free to the trade for use in consumer advertising. Some are circularizing the farmers, and turning over order upon order to various members of the trade. Why not do likewise? Some members are doing so and are finding it profitable.

A Question

IN speaking of the recent explosion of a hot water furnace, a member of the trade raised the question as to what the opinion of the Sanitary Engineer was in connection with the present method of supplying range boilers with cold water direct to the city water pressure mains. Almost every reader of this paper must know that some range boilers are very short lived, while others do not last very long, and often wonder why this is so.

To-day most range boilers are connected to the city mains direct, and any expansion which takes place must be relieved through the city mains. Sometimes the pressure runs as high as 125 lbs. per square inch, from a normal pressure of 30 lbs. per sq. inch, not only in the range boiler but also in the cast iron water front, and if a gas water heater is connected, it, too, is subjected to the pressure aforementioned.

Range boilers are like human beings, the less racking they are subjected to, the longer service they will render. We do not think for one moment that any ordinary range boiler, even though it is tested to 200 lbs. water test, should be connected to any city water main where the pressure is liable to be raised to more than 30 or 40 lbs. at the most.

The very best practice would be to run a cold water pipe to the highest point in the building and install an automatic expansion tank. Then connect the range boiler to it. By adopting such a method it would be found that range boilers would last much longer, and be a great deal safer, than is the case at present.

The Metal Markets

A GREAT deal of interest centres around the metal markets at the present time. There is a very good demand for metals used in the manufacture of war materials, but domestic trade is very quiet. There are, however, a number of interesting as well as disturbing features. Especially is this true regarding spelter. For some years prior to the war spelter did not show any great variation and with a few exceptions prices were much the same week after week. Since the outbreak of the war the Belgian and German markets have been closed and the advance in price has been phenomenal, eclipsing in comparison any movement in prices that has been seen in the world's metal markets. There is now a mad demand for spelter and prices being paid are nearly three hundred per cent. higher than those which prevailed a year ago. The shortage—or alleged shortage—and the high price of spelter has caused grave anxiety among manufacturers. A great many hardware lines in the making of which spelter is used, have been advanced in price and if present prices continue, many other products will have to be advanced. The spelter market at present is practically controlled by United States producers. During the past few years the United States has been the world's greatest producer of spelter. In 1913 the United States production of spelter was 31 per cent. of the world's total. Germany held second place and Belgium third. Some Canadian ore is shipped to the United States and smelted in the latter country. Antimony has also reached a price that beats all records. Aluminum, which for some time past has remained steady and unchanged, is developing strength and prices have advanced during the week. Copper and tin continue to remain at high prices, while lead is about the only metal that has not shown any market changes since the outbreak of the war. Lead is certainly very cheap compared with other metals.

Editorial Briefs

Don't be conspicuous by your absence at the coming National Convention.

* * *

St. John, New Brunswick, is the place where it is to be held this year.

* * *

The dates are June 22, 23 and 24. All live members are welcome.

* * *

Duty calls, make this trip fill a dual purpose, business and pleasure.

* * *

Don't forget that N.B. never forgot to turn up at past conventions.

Address on Gas Water Heaters

This Address was Delivered to the Ontario Society of Sanitary and Heating Engineers at Their Fourth Annual Convention Held April 22, 23 and 24 Last. A Large Attendance Gathered to Hear it, and Quite a Few Interesting Questions Were Asked.

By E. S. Stack, inventor of the Stack Gas Water Heater.

As this is the best season of the year in which to dispose of gas water heaters, the members of the Ontario Society entertainment committee felt it would be a very opportune time to learn all they could about the subject. Furthermore, Mr. Stack has recently brought the Stack gas water heater to Canada and has sold the Canadian patent rights to the James Morrison Co., Ltd., Toronto. The committee aforenamed, therefore, called upon Mr. Stack and arranged for him to address the society.

In opening the address, which was illustrated by lantern slides, Mr. Stack desired those present to bear in mind that he had not come before them to demonstrate his particular gas water heater, the slide views which he would have thrown on the sheet would bear this statement out.

The first illustration was that of an ordinary installation; this was followed by a description of various types of gas water heaters. Mr. Stack described an instantaneous direct contact heater. This was one which showed the water flowing through a fine perforated nozzle in a downward direction, on to a cone-shaped dise, underneath which was the direct gas flame. (See Figs. 1 and 2.)

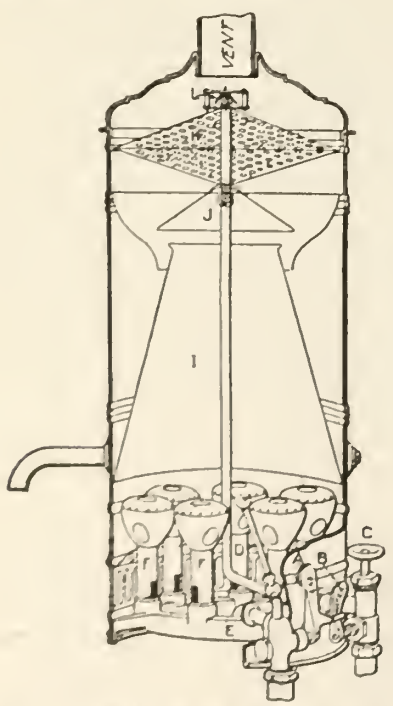


Fig. 1.—Interior view of direct contact gas water heater.

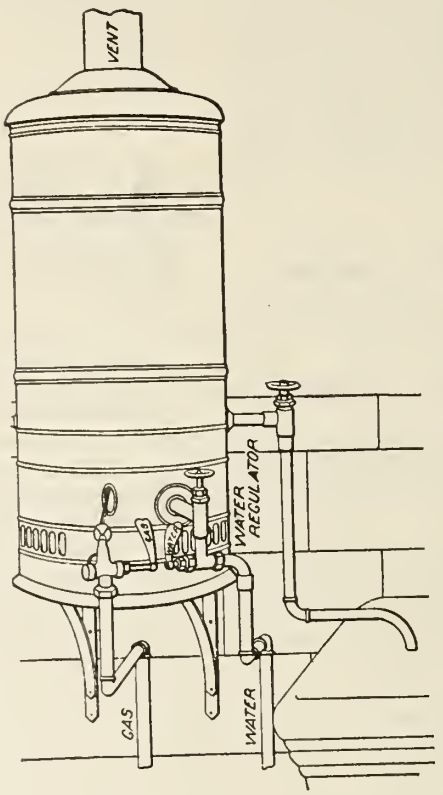


Fig. 2.—Exterior view of direct contact gas water heater.

While this type of heater was proved to be very handy in that water could be heated at a moment's notice, the consumption of gas was shown to be very great, and there was always a danger of the heating surfaces being burned out.

Another type of instantaneous automatic gas water heater was explained. This was a regular coil instantaneous heater connected direct to the town or city pressure. The pressure of the city closed the gas valve, leaving simply a small pilot light burning constantly. The moment any hot water tap was opened, the pressure being released, the main gas valve opened full, and, of course, heated the water instantly. These types of heaters were not connected to any storage tank or range boiler.

Next illustration thrown upon the sheet was that of a regular instantaneous heater connected to the city pressure with storage tank. It was automatically controlled by a thermostat. When the water in the tank became heated to a pre-determined temperature, the thermostat would come into operation, and close off the supply of gas, with the exception of the small pilot light. It was pointed out that unless the storage tank was well insulated with a good covering, the water in the tank would throw off a certain amount of heat, and thus cause the water to cool, which would cause the carbon in the thermostat to contract, and in that way open the gas supply. This operation would take place night and day, and would result in a large consumption of gas, all to no particular purpose.

The various types of gas water heaters, generally adapted for use in connection with a range boiler were next described.

In Fig. 3 is shown a type of heater consisting of two iron balls. One of the great disadvantages of this type of heater is that the heating surface is very small. That dirt is liable to deposit, as shown, thus decreasing the efficiency, and increasing the gas consumption. Fig. 4 was another type of heater mentioned. This, too, was proved to have various objectionable drawbacks, in that the two headers would catch a lot of dirt; the tubes were also liable

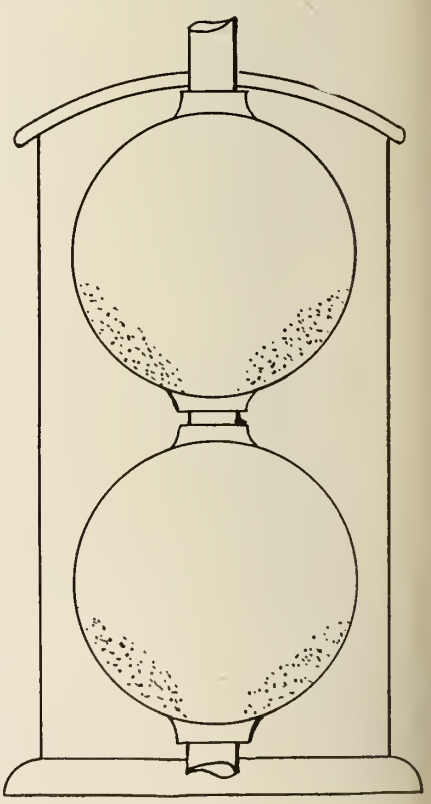


FIG 3.

Note deposit of dirt on flat portions.

to leak because of there being unequal expansion and contraction. The construction shows that there is no means of ensuring the same volume of water at the same temperature passing through all the tubes at once. In that case some tubes would be cooler or hotter than others, thus the tubes would be of unequal length, therefore causing them to leak.

Fig. 5 is of the type known as a disc heater, it being made up of a series of hollow discs, either brass or iron, mostly iron. While this heater gives fairly good satisfaction, it has the very bad feature of having shelves, as it were, upon which dirt could deposit, thus greatly decreasing the heating capacity, and, of course, increasing the gas consumption. The next heater described was that of a regular copper coil heater. This heater contained not less than 23 feet of tube, thus showing that before the water in the first turn of the coil was sufficiently heated, so as to cause circulation, the gas would have to be burning full on for 2½ minutes, and before the first water had actually circulated through the coil it would have to travel 23 feet.

One outstanding feature in Mr. Stack's address was that if the maximum of heat units were to be transferred from the gas to the water it would require a type of heater which would allow the largest amount of water to absorb these heat units in the smallest space of time. This having been accomplished, the construction of the heater would necessitate the establishment of a quick circulation, thus displacing the heated water quickly by a further supply of cold water.

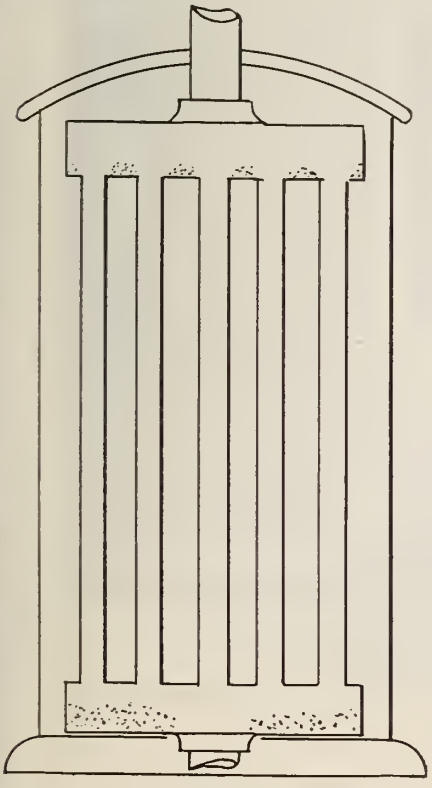


FIG 4.

Note deposit of dirt on flat portions.

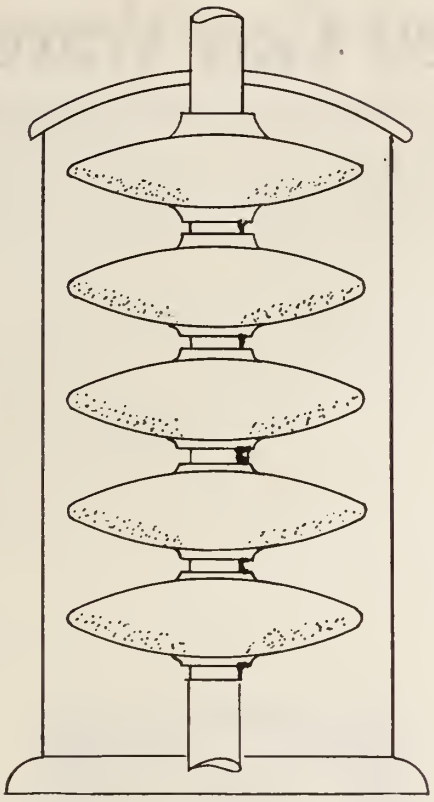


FIG 5.

Note deposit of dirt on flat portions.

Another very interesting slide was thrown on the sheet, that of two gas water heaters connected to one range boiler. (See Fig. 7.)

Both heaters are thermostatically controlled, one thermostat being inserted about one-third from the top, the other one-third from the bottom. By such an arrangement a person could have half the water in the boiler heated automatically, or the whole boiler full heated.

(Concluded in next issue.)

THERE'LL BE NO PLUMBERS THERE.

First Spasm.

During a late cold snap the fires of hell went out; the imp on guard over his satanic majesty awoke, and told him that all the pipes in his domain had frozen up and burst.

Second Spasm.

"Call a plumber," said His Majesty,
"From among our mighty crowd,
And have the pipes repaired, and remove his earthly shroud;
For his work we will knight him,
He's the only one we dread.
Give him all he wants to drink,
And see that he's well fed."

Third Spasm.

The imp scooted everywhere all around hell,
And hustled the subjects around pell-mell;
Until back to His Majesty, sadly he went,
And reported the message his subjects had sent:
"We have hunted and so might we hunt all the summer,
For we find that in hell there is nary a plumber."

Cheer up brother plumber, we may catch hell on earth: but, as you see, we're not in it later on.

P.S.—The above is vouched for by a printer's devil who was sent there after copy and "pi."

EFFICIENCY OF THE WATER TEST.

A Correction.

Under the above heading there appeared an article in last issue of The Sanitary Engineer and owing to an error in the mechanical department, the first and second Columns were almost unreadable, and should have read as follows:

To further illustrate our point, we show a soil pipe stack, Fig. 1, which has various points measured off and the approximate pressures to which the stack is subjected at those points. Fig. 2 shows a table which gives the pressure per foot head of water from 1 foot to 100 feet head, in feet. When requiring to know what volume of water there is in, say, a 4-inch stack, allow 13 lineal feet of pipe to every cubic foot, or approximately 7 gallons of water. The volume of water has nothing to do with the pressure, because pressure is a something per square inch. See Fig. 3, which shows one pipe ¼ inch in diameter and another 6 inches in diameter both are 100 feet in height and both are subjected to the same pressure per square inch. No doubt many of our readers have experienced greater trouble from joints at the lower end of a stack than at the upper ends, which is fully explained because the higher the joints of a stack, the less pressure are these joints subjected to. Here in Fig. 2 we show the soil pipe stack of an ordinary house, the total length of which is 33 feet. At the foot of the stack, or, shall we say, the joint at the bend, there is an approximate pressure of 14¼ lb. per square inch.

In June 15 issue we will further discuss this proposed method of uniform testing of plumbing installations and will also publish table showing how the pressures at various heights of a stack may be determined.—Editor.

How to Sell Gas Water Heaters

The Sale of Gas Water Heaters Must Be a Matter of Efficiency and Economy. Maximum Service, With a Minimum of Cost. To be a Successful Salesman, One Must Know All About His Product.

FOR some time past we have shown how sanitary and heating engineers could create new business with the farmers. In this article we propose to show how profits may be increased by selling gas water heaters. This is a line for which there can be no demand except where there is a cheap supply of gas. Most towns and cities have either artificial or natural gas. In the first place the sanitary and heating engineer must become thoroughly acquainted with the price of gas in his district. He must know what gas consumption will be required to heat a certain quantity of water in a given time.

He must verify all, or in fact any of the claims which manufacturers make for their gas water heaters. Not by any means because he suspects that many claims may not be dependable, but simply because the customer depends upon the word of the sanitary and heating engineer, and no gas water heater should be sold upon second hand claims. Thus it is necessary for the sanitary engineer to make tests for himself. He should have a range boiler set up for the special purpose of demonstrating to his customer exactly what the particular gas water heater he is handling will do.

One of the weakest links in the sanitary and heating engineer's selling plan is the lack of proper facilities to enable him to show the why and wherefore of an article he has to sell. For instance we will suppose that a sanitary and heating engineer intends pushing the sale of gas water heaters.

First, a demonstrating outfit should be fitted up. The heater should be so fitted up that if the customer desires, he or she can have that identical heater installed. Next, the range boiler should have several thermometers fitted into the side. These will show the progress of the heating of the contents of the boiler, as well as the cooling of it when the taps are turned on, or when the gas is turned of. Gas water heating is a very simple process. It is simply changing the units of heat from the gas to the water, and the most efficient

(Continued on page 29.)

BELYEA BROS., BATHURST ST., TORONTO.

A window display of gas water heaters, which resulted in the sale of nearly 20 gas water heaters within three weeks.

TWENTY YEARS AGO

THE following is an article which appeared in Hardware and Metal, June 1st, 1895, just 20 years ago. It goes to prove that good work and prices right to all parties concerned is the only basis upon which to build up a creditable reputation.

The John Ritchie Co., Ltd., is one of the most reliable concerns in the business.

AN OLD-TIME PLUMBER.

It is not many years since the art of plumbing was in a very primitive condition in Canada. John Ritchie, the well-known Adelaide Street tradesman is one of the old school of Toronto plumbers.

He came to the Queen City in 1857, after successfully following the trade for several years in Aberdeen, Scotland and New York.

"When I came to Toronto," observed Mr. Ritchie to Hardware and Metal the other day, "Toronto was not as big as it is now. There were only about 50,000 people here then, and the primeval forest covered a great deal of the land now occupied by streets of substantial business blocks and dwelling houses. Both partners of the firm of Thompson & Keith (now Keith & Fitzsimons), came over with me and started business at the same time. There were then only three plumbing firms in Toronto besides ourselves, viz., Cummings & Wells, George Hardy and James Crapper. There was very little plumbing done in Toronto in those days and that little was poorly done. The facilities for good work were limited and therefore none was ever attempted. The city water service was only supposed to raise water to the first floor in a house, and it was the custom to carry the street drain right under the building and drop the soil pipe straight into it, without further ado. Architects and contractors were so used to having unsanitary plumbing done that they, at that particular period, were refusing to include plumbing work and material in their tenders or estimates on specifications.

The late John Ritchie, founder of the John Ritchie Co., Ltd., Toronto, in the year 1857.

"Shortly after my arrival, however, the standard of plumbing began to rise and it was my lot to do the first real work of that line done in Toronto. Architect Joseph Sheard secured a contract for a house at Scarboro' for the late Peter Paterson, the retired hardware man. I tendered independently for the work of plumbing, estimating the cost of the job at $250. Mr. Paterson thought this was extortion as the other tradesmen were willing to do the work for $50. But I told him that I had never yet seen any plumbing worth the name in the city, and that if he were not satisfied with the job when it was finished he need not pay me. When the work was done, however, he was perfectly satisfied. This was really the first piece of sanitary plumbing done in Toronto, and after that my fame spread and I got lots of work to do and made lots of money."

Mr. Ritchie then talked for a while about the evolution that has taken place since the fifties and sixties in the skill of plumbing and in the class of tools and materials used by them. Soil pipes were all lead then instead of iron, and gas pipes made of a composition instead of out of iron.

He continued: "At that time all gas-fitting was done by gas-fitters employed by the gas company. If a citizen wanted gas in his house or place of business he went to the company's office and submitted a sort of specification as to what he desired. The company put in the service and charged whatever it liked for pipes, jets, etc." The public were dissatisfied with this arrangement and when Mr. Ritchie and other plumbers introduced a gas-fitting department into their business, citizens began to employ them to do their work. Soon after the gas company discharged its gas-fitters, and that department of the work assumed the shape it retains to-day.

Mr. Ritchie's first place of business was on King St. east, where he remained for 20 years. Since then he has occupied his present Adelaide St. stand. When he started his store Toronto had five master plumbers; now she boasts a hundred.

* * *

At the time when this article first appeared, Hardware and Metal ran a separate department in the interest of the plumbing trade. Some eight years ago a separate publication was launched and was given the title Plumber and Steamfitter, when exactly two years ago the Sanitary Engineer took upon itself the present title.

The story related 20 years ago refers to work which the late John Ritchie did 20 years before that and shows to the trade at the present day that if one wishes to make a success of business, and build up a creditable reputation for one's self, it is necessary to refrain from all semblance of price-cutting and pay every attention to quality and efficiency of installations. The whole trade has progressed insofar as those principles have been practised, whereas if the motto has been "Cut the job to suit the price," ruin has followed in every case.

What the world wants is efficiency in every sense of the word, and the proof of such a statement is shown by the fact of there being men in business who have fought a fair fight and have succeeded. The late John Ritchie is one of the many examples the trade should follow.

MORAL: Never execute any work down to a price, but rather up to a standard.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 5.

EVERY engineer must learn where to get and how to use the information he needs in his work; reference books are part of his "tools." At the close of these articles there will be printed a bibliography giving a list of books relating to the various subjects treated. From this list the reader may select books for further or more advanced reading and for reference. For the present for those interested the following books are recommended:

Chemistry and Its Relation to Daily Life, by Kahlenberg and Hart.

Bacteria in Relation to Country Life, by J. G. Lipman.

In the presentation of matter so far no claim of originality can be made. We are dealing largely with elementary and well-known facts. The writer's own notes and observations have been simplified or verified, where necessary, by references to different authentic sources of information.

Bacteriology.

All living animal and plant cells, including the bacteria, are filled with protoplasm, which substance on this account has been called by Huxley "the physical basis of life." This protoplasm is a viscid, semi-liquid, more or less granular substance. It is about 4-5 water and the balance chiefly proteids with small amounts of fat, carbohydrates and mineral salts. Proteids are organic compounds of carbon, hydrogen, nitrogen, oxygen and sulphur, a typical one being expressed chemically as $C_{72}H_{112}N_{18}O_{22}S$. Fats and carbohydrates are compounds of carbon, hydrogen and oxygen. The protoplasm is generally surrounded by a hard cell wall. If the cell wall is soft and sticky, a large number of similar bacteria stick together in a jelly-like mass termed Zooglea. Ordinarily, however, bacteria float freely in a liquid, though the manner in which some of the cocci in multiplying stay in groups has been shown in Fig. 3. Minute quantities of lime, magnesia, phosphoric acid and in some cases iron, may be necessary for the growth of bacteria. The "sulphur" bacteria of springs and the sea contain little granules of sulphur.

In the cycle of life and decay continually taking place on the earth bacteria more particularly, but also other allied microbes, the yeasts and moulds (see Fig. 9), play such an important part that life without them is not conceivable.

Green plants get their carbon from the carbon dioxide (CO_2) of the air. The rays of the sun supply the energy necessary for the breaking up of the CO_2 in the presence of the green coloring matter called chlorophyll. Nitrogen exists in the atmosphere from which it enters the soil, and in the form of salts is taken up by the plant. Animals eat plants and in life give off to the atmosphere CO_2 in breathing and to the soil excreta containing nitrogenous matter. Both animals and plants in decomposition return their nitrogen to the soil. Thus we have a complete carbon and nitrogen cycle. It can be shown that bacteria aid in plant life, but it is in the decomposition of animals and plants that the microbes are so essential. Without them the earth would be covered with dead matter that now through their agency returns to the soil to be used again.

The new born babe generally is free from microbes, but they immediately begin to settle on the infant out of the air. By way of the nose or mouth they reach the lungs, and in a few hours they have reached the intestines with the child's first food.

Streptococci and Staphylococci (see Fig. 3) are found on the skin. Press a fold of skin at the side of the nose and a colony of the latter will be squeezed out. They are harmless unless the skin is injured. The mucous membrane which is the lining of the nose, mouth and intestines is warmer and moister than the skin. It is thus more attractive to the microbes and also more easily penetrated. As before mentioned, bacteria that cause disease are termed pathogenic. In the nose such bacteria may lodge, as for example, diphtheria and pneumonia microbes. The stomach is acid, due to HCl (hydrochloric acid) which is needed to aid in digestion. Moulds and yeasts grow better there than bacteria which generally prefer a neutral or alkaline to an acid surrounding. Fig. 9 shows a sketch of magnified yeast cells, and of the common "blue mould."

Yeast cells float in the air, and, settling on anything of a sugary nature, take the starch out of it. Yeast is used in making bread, as in action the cells cause the liberation of CO_2, which gas, caught in the dough, makes it rise. They multiply by "budding," as shown in Fig. 9. If a piece of bread or lemon is left out in the air there will generally form on it a fine growth of a whitish or blue-green tint. This growth is due to moulds, which are microscopic fungi. Pathogenic moulds may cause ringworm and thrush diseases in the mouth.

In the intestines there are millions and millions of bacteria of different kinds. We discharge some billions every 24 hours, of which possibly 100,000 millions are still alive. This fact indicates the large number of bacteria present in sewage. These bacteria, amongst which is the bacillus coli communis, seem to serve no useful purpose in the intestines and are, on the contrary, often detrimental. They may cause putrefaction in the large intestines and the resulting poisons are then absorbed into the system.

The bacteria have not, like green plants, the ability to get their carbon from the air and they consequently must live on organic matter. Those that live on dead organic matter are called saprophytes. Those that live on live organic matter are termed parasites and these generally are the pathogenic organisms. Another important classification of the bacteria to be noted is that into aerobes and anaerobes. Those that can exist only in the presence of the oxygen of the air are termed aerobes and those that thrive only when air is excluded are termed anaerobes. The lockjaw bacillus (see Fig. 5) is an example of a pathogenic anaerobe. Both kinds may be found together, the aerobes using up all the oxygen and thus allowing the anaerobes to exist. Also some bacteria can exist either with or without air, as aerobes or anaerobes.

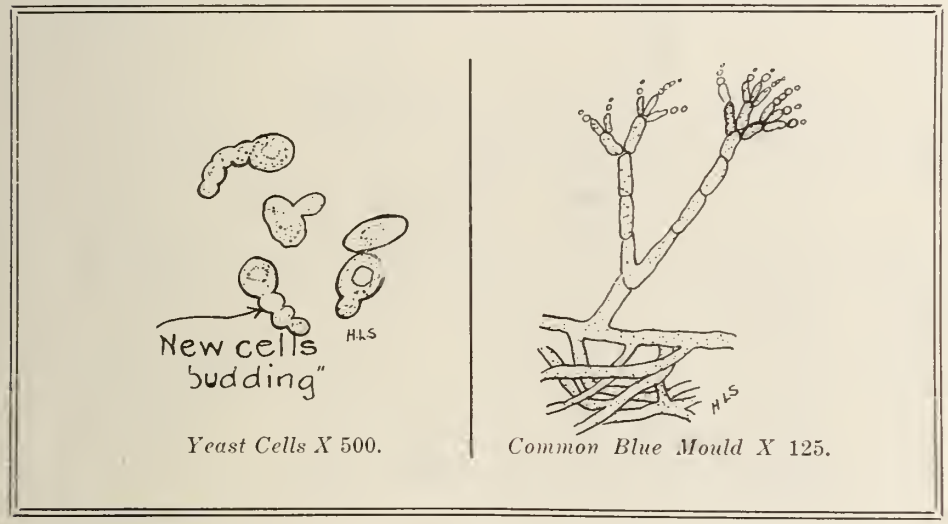
We will later discuss a number of diseases and the modes of infection, but we will now investigate in general how the pathogenic bacteria cause disease. Having got through the skin or mucous membrane the bacteria start to grow and multiply. This is the Incubation Period. If the body cannot fight them off, then

comes the Lesionate Period, when rash or ulcers appear, due to an alteration of the tissues. Bacteria in getting their food seem to produce poisons, toxins, which destroy the tissues and may cause death. In digesting their food they may also give up other harmful poisons.

When we think of the great number of bacteria in the world we might wonder why we do not all become infected with various diseases. In the first place, only a few of the bacteria are harmful. Very few pathogenic bacteria form spores, and many cannot live long outside the body and die of "old age" before doing further harm. Direct sunlight will destroy bacteria in the air or on the surface of water or soil. Drying will also destroy them, very little growth occurring after the moisture content is reduced below 25 per cent. In salting meat the salt takes up the water from the bacteria, thus killing them. In preserving, sugar acts the same way, taking away the moisture necessary for the bacteria. When met with other similar organisms in the struggle for existence, the pathogenic organisms may be killed. Alkaline soils and acid soils may both be unfavorable, and oxidation generally results in their destruction. If the bacteria resist all these unfavorable influences it is still possible for them to enter the skin only through an abrasion or through the more delicate mucous membrane, which, though it does not offer such a resistance, is generally protected by the nose, where in the nasal cavity the air is filtered and dust particles held. The stomach acids and intestinal bile also kill some bacteria. Finally, if the bacteria succeed in reaching the tissues, even then the action of the blood may kill them all if they are not too numerous. About 1-13 of the weight of the body is made up of blood.

In a cubic millimetre of blood there are some 5,000,000 red bodies called corpuscles and from 5,000 to 10,000 white bodies or white corpuscles, in a fluid called plasma. The white corpuscles seem to be the natural enemies of the bacteria and "eat" or absorb them. One white corpuscle may destroy twenty bacteria. Also in case of infection the number of the white corpuscles may be greatly increased as they are needed. If the bacteria get the upper hand the patient has to suffer the disease, but to combat the poisonous toxins produced by the bacteria the body is able to form antitoxins which generally, in time, get the better of the disease. This last period, when the patient is recovering, is called the Decubation Period.

In some diseases antitoxins have been obtained that can be injected into the patient to aid him in his fight against the toxins formed by the bacteria. An animal is inoculated with a certain disease, and as it is recovering some blood, which then is rich in antitoxin, is taken from it. The serum (the clear liquid portion of the blood) is used for injecting into or "inoculating" the patient. Such antitoxic serums are used for cholera, diphtheria, lock-jaw, hydrophobia, etc.



Yeast Cells X 500. *Common Blue Mould X 125.*

Fig. 9.

To make the body immune from contagious diseases, vaccines are used. It has been noted that after some diseases people seem to be immune ever after against those diseases—the body has been able to throw off the bacteria and its poisons and formed certain defences against them. By injecting mild forms of the bacteria or dead bacteria the body is caused to form these defences without suffering the virulent form of the disease and then may in future be able to resist the real disease.

People who object to vaccination point out the inconvenience and danger of being subjected to even a mild form of the disease, which for some may prove severe or possibly fatal. They point, rather, to proper sanitary and hygenic methods as a means of avoiding contagion. It has been said that in the Russo-Japanese war the Japanese used no vaccination whatever, but before the army moved ahead bacteriologists and chemists had investigated the proposed new camping ground and made sure of proper sanitary conditions as regards water supply, etc. Their loss from contagious diseases was reported as much less than that of the Russians. This statement may or may not be true, but it attracts our attention to the fact that the duty of the sanitary engineer is to make conditions so sanitary that infection is impossible and vaccination unnecessary.

Vaccines are now used for small-pox, cholera, influenza, pneumonia, typhoid, etc. For some years the British army has employed anti-typhoid vaccines for troops in India, Egypt, etc., where typhoid outbreaks were feared and where it was not always easy to adopt hygienic measures. For the present war our soldiers have been inoculated against typhoid with anti-typhoid vaccine made from dead typhoid bacilli. The effect of the vaccination is supposed to last about four years.

(Continued in next issue.)

PROPOSED PROVINCIAL PLUMBING BY-LAW.

(Continued from page 19.)

CLAUSE 61.—No vent pipe shall be used as a soil or waste pipe.

CLAUSE 62.—No vent pipe will be allowed to connect to another vent below a point above the top of fixture for which it is used.

CLAUSE 63.—The vent pipe for all traps shall not be less than one size smaller than the trap which it serves, and no vent shall be less than $1\frac{1}{4}$ inch in diameter.

CLAUSE 64.—Vent pipes for water closets shall be connected to the highest point of the bend or of the hub to which the bend connects, and must be at least 2 inches in diameter. Closet vents into which other vents are connected shall be 3 inches in diameter.

CLAUSE 65.—Where two or more vents are connected with a main vent, such main vent must be increased at least one size in diameter.

CLAUSE 66.—No wrought iron vent pipes will be allowed below the top of cellar floor or to be buried under the earth.

CLAUSE 67.—All vent pipes shall be run as direct as practical and be so graded and connected that any condensation will drain back to the waste pipe. If one and one-half inches in diameter, they shall not exceed 30 feet in length. All offsets shall, where practicable, be made at an angle of 45 degrees.

(Continued in next issue.)

HOW TO SELL GAS WATER HEATERS.

(Continued from page 24.)

gas water heater is one that will transfer the most gas heat into the maximum amount of water in the minimum period of time, and a properly fitted up demonstration outfit will prove actually what the gas water heater will do. This is a period of "seeing is believing," and the customer has a right to see before he buys. The more a customer is convinced of the advantages he is to receive before he invests, the better he will be pleased. Fig. 1 shows a range boiler and gas water heater connected up in the usual way. The boiler is fitted up with a seriesof thermometers.

We will suppose a 30-gallon boiler is fitted up, with six thermometers at equal distances down the side. This will demonstrate to the customer the period of time that the burner is to be lit before a certain quantity of water is raised to any given temperature. Let us suppose for argument's sake that all the thermometers are registering the same temperature, say 60 degrees. The demonstrator takes out his watch, lights the burner up. Then watches the temperature rise at the first thermometer at the top, there being six, and the gas burner will consume a certain number of feet of gas per hour.

Divide the hour consumption by the period the burner is lit, and note the quantity of water heated. Then the cost of heating, say five gallons of water from 60 degrees to 125 degrees can be arrived at. This can be done right before the customer's eye, and as we said before "Seeing is believing these days."

Another very dominant feature to be explained is, that you stand behind the reputation of the heater.

It's all very well for a sanitary engineer to have faith in the manufacturer of the gas water heater, but that is not enough. It is you to whom the customer will look for satisfaction and you only. Just imagine yourself in the customer's place.

This being the case it is you who must know every point about the heater you are selling. It is you who must find out for yourself all the good points of the heater and in that way you will know and will become all the more successful in selling gas water heaters.

In speaking to Mr. Belyea about the sale of gas water heaters, we were informed that they had sold upwards of 15 heaters as a direct result of putting up a good show. Not only had this display pulled gas water heater business hot, it had also resulted in several customers coming in to examine other lines. It will be seen that gasolene is sold from a tank.

During the brief interview we had with Mr. Belyea, no less than four persons called for a supply of gasolene. One of the four stepped in and examined several gas stoves, and from the impression which Mr. Belyea seemed to have conveyed to these people, a sale will no doubt result. This firm take advantage of all circulars which the manufacturers supply to them, and find that by adding their own name, putting up a special display, and arranging that one of the firm is on hand to explain the most minute details of the stoves that they are getting new business. No line should be as good a seller just now as the gas water heater, and, as we stated before, this is especially the case if the sanitary engineer has studied the line he is selling, and can explain every "why and wherefore."

Belyea Bros. have made good money on every gas water heater. Why? Because they first examined the heater they intended to push, installed one in their own place, found out first hand what the heater would do and then went at it. There is not a fixture in the ordinary residence which can be as much appreciated as a good gas water heater which is giving every satisfaction, and

(Continued on page 29.)

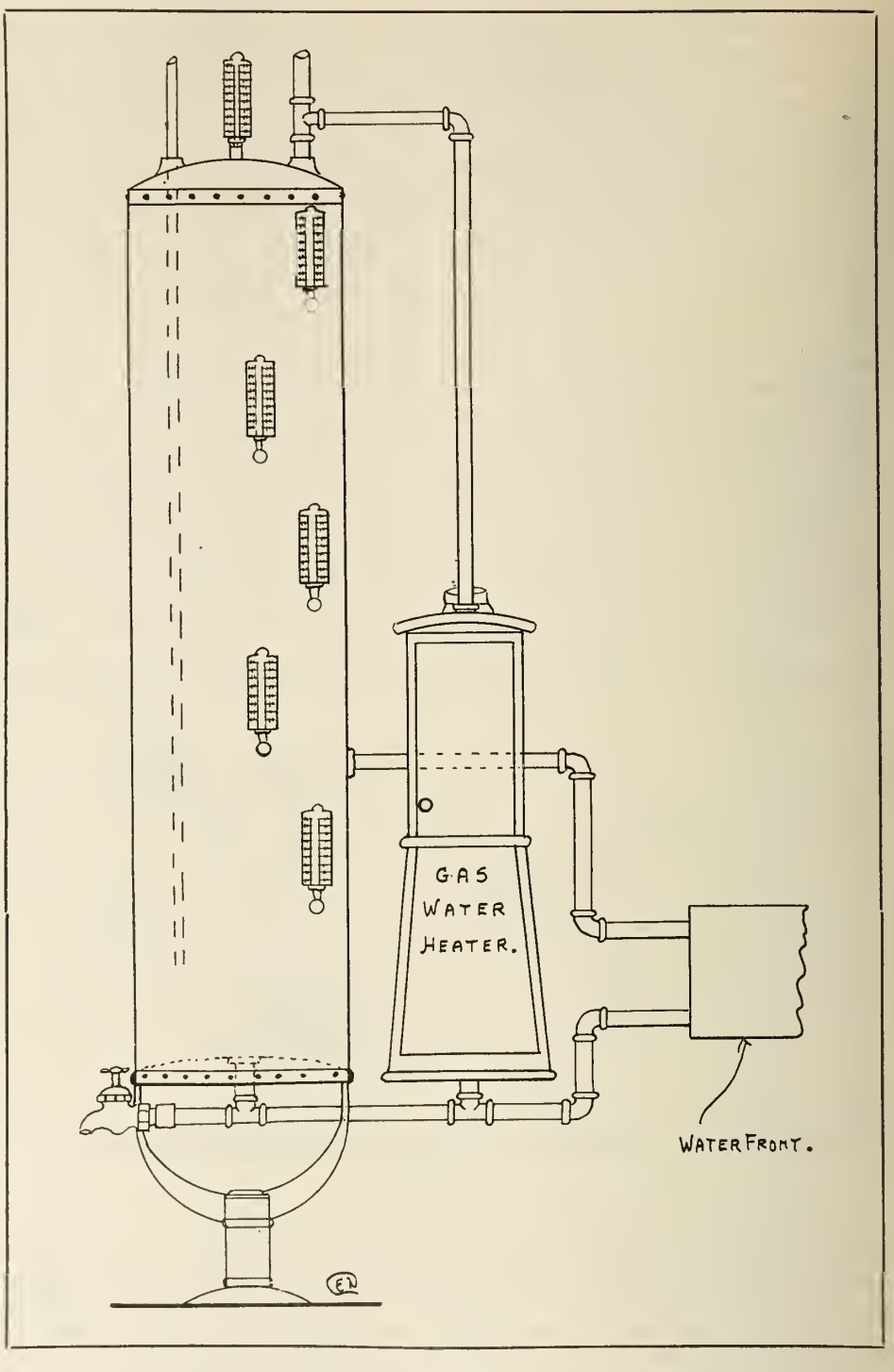
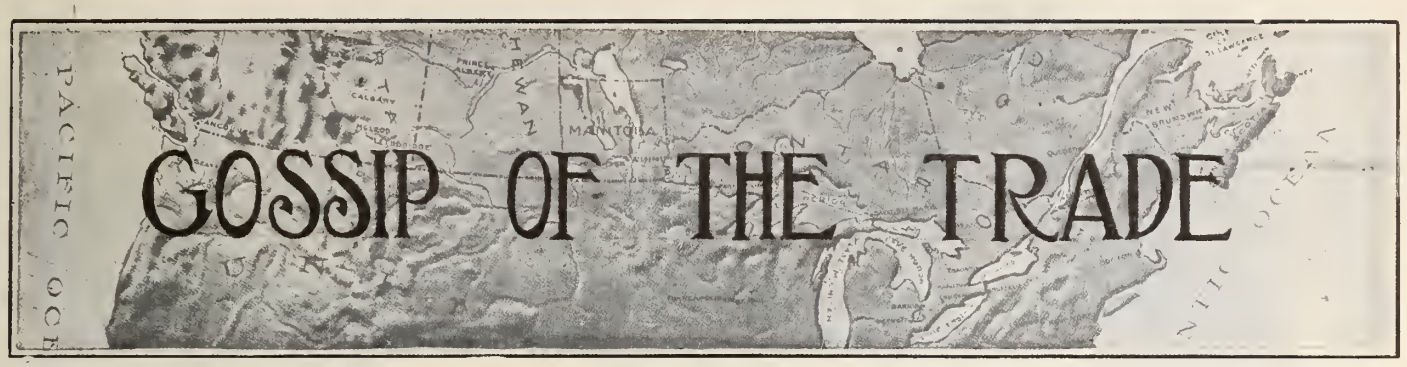


Fig. 1.—Showing range boiler with thermometers inserted at intervals in side of range boiler for practical demonstration purposes.



AMERICAN LOYALTY.

The heavy migration of Americans to Canada in the last few years caused some concern among investors and others in the motherland as to the loyalty to the Empire of these new British subjects in times of stress. There need be no fear on that ground however. Many of the early and most bitterly loyal Canadians were the Germans and Dutch, who sided with Britain in the Revolution of 1775, and migrated to Canada rather than remain in the States. The Ryersons, for example, have descended from these Dutch settlers. Mrs. Warren, who lost her eldest son on the battlefield in France, is an American, from Montclair, N.J., as was her husband, the late H. D. Warren. He helped to build up and become president of the Gutta Percha Rubber Co.—at its inception the branch of a U.S. concern—and at the time of his death was a director of the Canadian Bank of Commerce.

Another case of a brave and loyal American woman has just come under the notice of Sanitary Engineer. The Gurney Foundry Co., Toronto, has an extensive metal manufacturing plant and recently Mr. Gurney offered to place it at the disposal of Britain for use in any capacity. In explanation, Mr. Gurney said he was doing so on the urgent solicitation of his wife. "She said to me," Mr. Gurney explained, "'You are too old to go to the front yourself, but we must do something for the Empire. Britain needs ammunition. Perhaps the Gurney Co. can make it." Mrs. Gurney is an American.

REGINA TO ADOPT PLUMBING BY-LAW.

A resolution was passed at a meeting of the Trades and Labor Council recently, urging the City Council to take action in respect to the passing of a plumbers' by-law for the protection of the health of the citizens of Regina. The question was brought up by a delegate of the Plumbers' Union, who stated that two or three years ago a similar request had been made, but no action had ever been taken. The co-operation of the Trades Council was urged in the matter.

It was asserted that Regina was the worst place in Canada so far as a plumbing by-law was concerned. Plumbing was being done by people who did not know anything about it, thus endangering the health and lives of the residents. The reply which the plumbers had received from the civic authorities was to the effect that the by-law would be pressed when circumstances would permit.

ERECTING NEW STORE.

Robt. H. McClatchie, Ayers Cliff, Que., tinsmith and plumber, is erecting a new store and work shop, and a garage.

TRADE CATALOGUES WANTED.

The Chas. D. Kirk Company, 312 Tribune Building, Winnipeg, Man., desire manufacturers and jobbers to furnish them with catalogues of plumbing, heating and ventilating supplies and material. Pneumatic water systems, air compressors, pumps, sewage ejectors, tanks, boilers, furnaces, radiators and all other specialties used by sanitary, heating and ventilating engineers.

MORE PROSECUTIONS.

A number of persons were haled to the Toronto police court recently, and fined for dry store sweeping. More have been summoned, and will come up at a later date. The M. H. O. points out that the store refuse has many germs in it, owing to the fact that it is not exposed to the sun's rays as the street dust is. It has been proved that this exposure to the sun's rays makes the street dust almost harmless.

Comment.

From this it follows that the old method of using a broom to sweep up the dust and other refuse, which is not subjected to the rays of the sun, etc., is dangerous. Sanitary and heating engineers have a new field opening up for them. The stationary vacuum cleaner is coming to stay. Before very long every house will require to be fitted up with a stationary vacuum cleaner, which is just as necessary as any other sanitary fixture.—Editor.

TENANT LIABLE FOR FIRE LOSS.

In the Supreme Court in the Province of Quebec, judgment has lately been given against a tenant to the extent of $12,000. The case arose over a fire which occurred in January last. The water pipes on the premises became frozen and the occupants used a gasolene torch in thawing the same; the evidence shows that as the torch was lighted the flame jumped to some woodwork and quickly spread through the building via the stairway. Although a clause in the lease relieved the lessors from liability over accidental fire, the judge held that there was a certain amount of negligence and gave judgment for the difference between the insurance received and the actual loss sustained.

NEW BOOKLET.

A very interesting booklet is being sent out to heating engineers describing the Richardson vapor-vacuum-pressure system of heating. It is highly illustrated, and may be procured free upon applying to Messrs. Richardson & Boynton Co., boiler manufacturers, 171 West Lake street, Chicago.

ENGINEER FOR TECHNICAL SCHOOL

Alexander Kirkaldy has been appointed chief engineer for the new Technical School at Toronto, by the Board of Education.

HOW TO SELL GAS WATER HEATERS.

(Continued from page 28.)

there certainly isn't a more annoying thing than one which is not giving satisfaction owing to the fact of it being rather a gas "eater" than a gas heater.

We cannot conceive of one appliance, if it is giving good satisfaction, which is apt to pull other business for the sanitary and heating engineer, better than a good gas water heater. The field is his by right, and no doubt he will get it if he goes after it.

Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

HOW TO DETERMINE RADIATOR CAPACITY.

Editor The Sanitary Engineer.

I would like to ask you a few questions upon the following subjects, and would like to read the answers in the next issue of your valued paper.

A Constant Reader, G. D. B.

Is there any simple rule by which I could determine the amount of radiation in any make of radiator?

This is not by any means a simple proposition. The proper way would, of course, be to measure the surface of radiation. The term radiation, when applied to hot water or steam radiators, means every portion of metal which will give off heat contained in the interior of the radiator.

All radiators in Canada are now standardized, and the simplest way to ascertain properly the radiation of any make of radiator would be to apply for a fitter's manual to any of the firms manufacturing radiators and boilers, whose name appears in the classified buyers' guide in this and every issue of The Sanitary Engineer.

How to Measure Piping for a 45-degree Offset.

Fig. 1 shows diagram of an offset. The method to adopt is as follows:—First, determine what distance of an offset is required, as shown at B-B at the rate of 3 inches to each foot up to 3 feet of an offset. For instance, if an offset of 12 inches is required, the piece of pipe, as shown at A, would require to be 17 inches, or to be more accurate, 16.92 or 40 inch to each inch of an offset required. It must not be forgotten that the definition is the distance between centre of pipes, as seen at B-B.

This method will be found suitable for any length of offset up to about 3 feet. For anything larger than 3 feet it would be best to draw a square on the floor to scale the square of the offset; place the two 45 elbows at centres, and take measurements from corner to corner.

Clean Expansion Tank Glass.

Q.—Can you inform me how to clean the glass in an expansion tank?

A.—If the gauge glass mountings have a plug in the bottom or top, unscrew them and make a small swab with a little waste and a piece of stove pipe wire; dip the swab in a little muriatic acid, and run the swab up through the glass. Then wash with clean water. Of course, the water will have to be run off below the level of the bottom outlet.

If there is no plug in the mountings, the only way to clean the glass is to take it out, repack the glands and grease well the threads before putting the glass back. Why not use more automatic expansion tanks? The writer was six years in Canada before he ever saw a closed expansion tank with a gauge glass.—Editor.

THE PROPER POSITION FOR A GAS WATER HEATER.

Editor The Sanitary Engineer.

I have always maintained that a gas water heater should be as low down as it is possible to put it. I don't myself really know why; but I remember taking a gas water heater out, which was put in away up, and would not work. All I did was to lower it, and it worked fine.

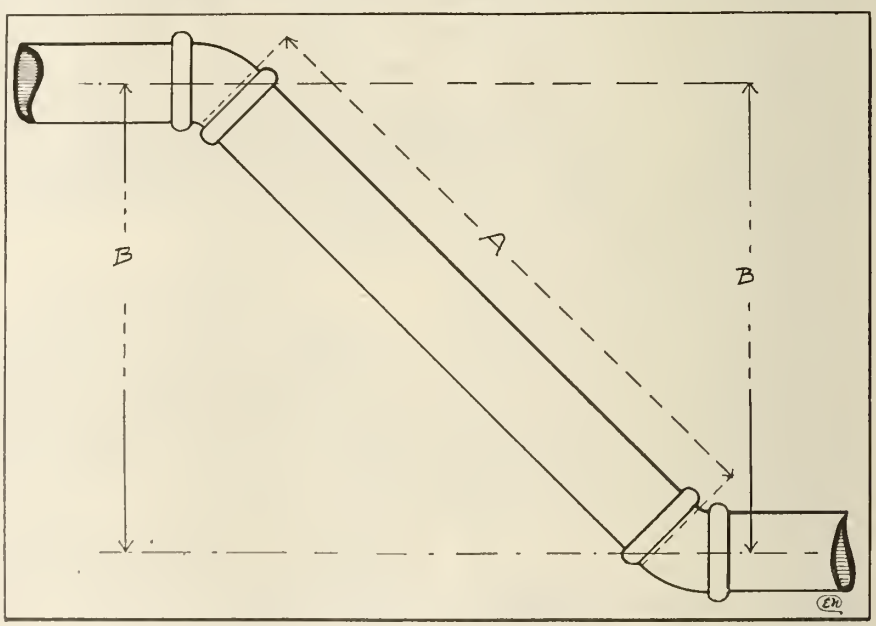


Diagram showing how 45-degree measurements are ascertained.

Ever since then I've put them low down. Can you tell me the proper position in which they should be placed?

GAS HEATER.

There are extremes in everything, and no doubt the first heater mentioned must have been too high up. The proper position in which a gas water heater

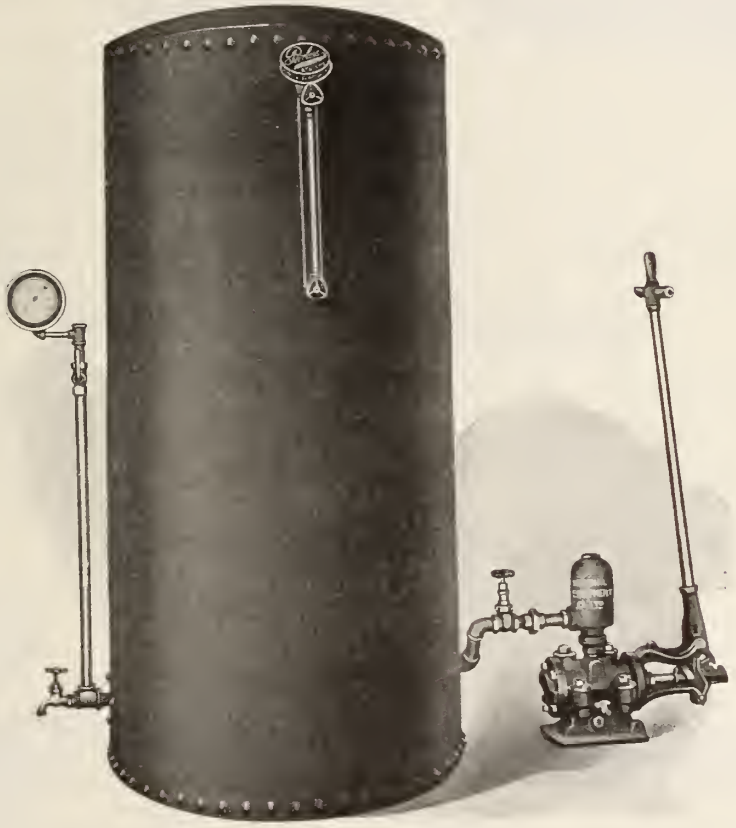
(Continued on page 32)

Warning

There are pneumatic tanks now being offered to the Canadian trade that weigh less than 50% of those which we supply—and our weights are based on well-recognized engineering practice.

Can you afford to save a couple of dollars by buying such goods?

Your reputation in years to come will depend upon the quality of the goods you supply to-day



"Peerless" 112 Series

National Equipment Company,
LIMITED
Toronto, Ontario

QUESTION BOX.

(Continued from page 30)

should heat well is as follows:—The lowest portion of the coil in heater should be about level, or, say, an inch higher than the bottom of the boiler, and the pipe connecting it to the boiler should be furnished with a draw-off cock, so as to be able to keep too heavy a deposit of dirt from accumulating. While no doubt a heater installed "away low down" would heat all right, and much better than if it were installed high up, there is a danger of dirt depositing in the lower coil or portion of the heater.—Editor.

WHAT'S THE TROUBLE?

Editor The Sanitary Engineer. — Within the last few months our fire brigade have had an unusually large number of calls to fires, and I have noticed that every time the fire pressure was put on the mains, it has resulted in range boilers giving out, or else the lead pipe just above the wiped joint which is made to join the boiler coupling to the lead has given out on the hot water pipe. Normal town pressure is 35 to 40 lbs., but when the fire pressure is put on it runs as high as 100 lbs. I do not think range boilers should give out when they are tested to 150 to 200 lbs. Can you explain the trouble?

S. E., B. C.

This is a question which comes before us often these days. In the first place the method which is so commonly adopted of connecting range boilers direct to the city main is wrong. We are at a loss to know how ever such a practice became so universal in Canada, except that it is cheaper. Smaller pipes can be used, etc., when such is the case. All range boilers should be furnished with an expansion tank in the attic with a circulating pipe run to and from it. For an ordinary residence with one bathroom, kitchen and laundry tray, a one-half inch pipe should be run to a tank from cold water main and then a ¾ inch pipe run to a point where the last two branches are taken off, then reduce it to two half-inch pipe branches, and half-inch branches taken off for each fixture. No range boiler should be subjected to a pressure of more than 30 lbs. under any condition, and the reason why boilers give out in the way mentioned is because they are not built to stand such pressures under working conditions.

There is not only pressure to contend with, but the suddenness with which pressure is turned on when a fire alarm is rung. Then there is sudden expansion and contraction to contend with as well.

The reason why the lead pipe gives way is because of these being unequal expansion and contraction next to the joint, and it will be noticed that the lead pipe has the appearance of having been stretched. Many of these cases could be avoided if the wiped joint were made a little longer, not so heavy and not wiped with too abrupt a finish at the lead side of the joint.—Editor.

SHOULD YARN BE USED ON THREADS.

Editor The Sanitary Engineer.—I am a fitter by trade, and have worked in several cities in Canada. Some bosses demand that I put yarn on the pipe threads so as to ensure a tight joint, while in some cities yarn is a thing unknown. Can you tell me which is right the use of yarn or not.

A READER FITTER.

This is a question on which the writer himself feels very strongly, and we are pleased to have this question come in. The use of yarn is nothing more or less than foolish. Any mechanic who cannot make up a thread joint without using yarn, should do one of two things, either get a new set of dies and stocks, or quit the trade. The use of some kind of lubricant such as oil and graphite, or a good pipe joint compound may be used to advantage.

The use of yarn on iron pipe threads came into practice long ago, and the reason was, in those days a taper could not be depended upon. Neither could the threads be guaranteed as uniform, but up-to-date tools have eliminated all such troubles. Fittings are all uniform with possibly an odd exception now and again. No. Reader! yarn should not be used at all.—Editor.

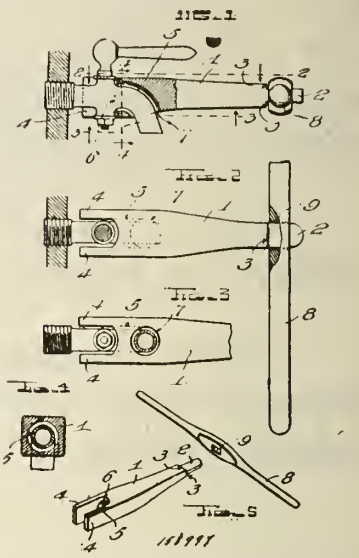
NEW CANADIAN PATENTS.

John H. Brown, Grand Forks, North Dakota, U.S.A., 17th November, 1914; 6 years. Filed 13th October, 1914. Receipt No. 243,979.

Claim.—1. An article of the character described comprising a body member spaced apart ears formed on one extremity thereof, said body member having therein an arcuated extending socket to the rear of said ears to co-operate with the latter, and a handle carried by the other extremity of said body member.

2. An article of the character described comprising a body member, spaced apart ears formed on one extremity thereof, said body member having therein an arcuately extending annular passage to the rear of said ears, one end of said passage communicating with an opening intermediate the said ears, the other end communicating with an opening in the side of said body member, and a handle carried by the other extremity of said body member.

3. An article of the character described, comprising a body member, spaced apart ears formed on one extremity thereof, said body member having

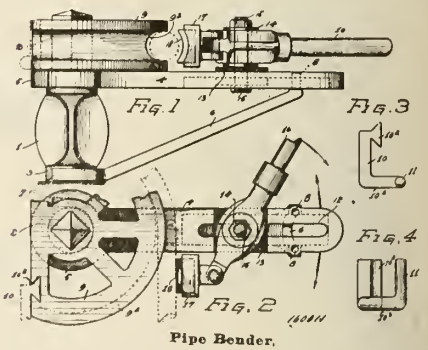


Wrench.

therein a socket immediately to their ear of said ears, said socket extending obliquely through said body member and communicating with an opening formed in one side thereof contiguous to said ears, and a handle carried by the other extremity of said body member.

Omer Caron and George Suprenant, co-inventors, both of Maisonneuve, Quebec, Canada, 12th January, 1915; 6 years. Filed 11th August, 1914. Receipt No. 242,191.

Claim.—1. In a device of the character described, a revolubly mounted



Pipe Bender.

beam, bracing and supporting means therefor, bending means revolubly and adjustably mounted on said beam, a fixedly mounted bending form adapted to co-operate therewith, and a pipe securing means carried thereby.

Quick Hot Water at a Big Saving
——of Gas——

ONE MINUTE AFTER THE

Stack Gas Water Heater

IS LIT IT GIVES HOT WATER AT THE TAP

This is actually the most durable and long-lived Copper Coil Gas Water Heater made—it is the easiest and quickest to instal.

Cost but little more than the ordinary heater, but the extra cost is quickly covered by the savings effected.

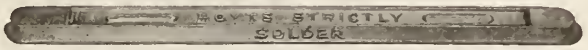
EASILY SOLD ***BIG PROFIT***

James Morrison Brass Mfg. Co.

Limited

93-97 Adelaide Street West, Toronto

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

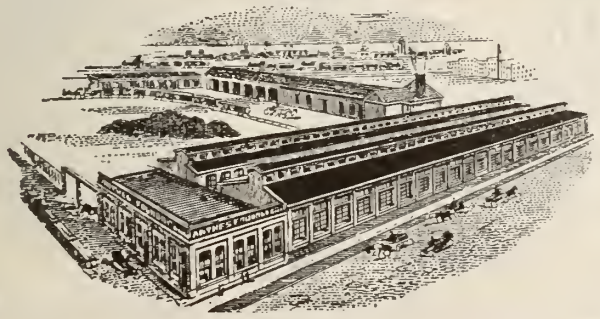
Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

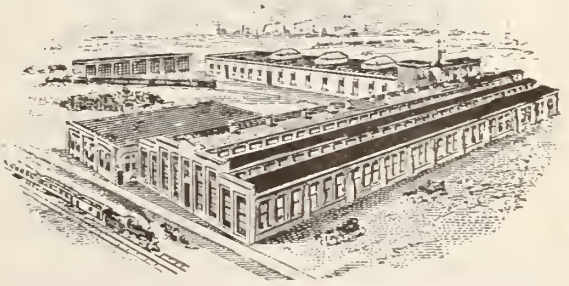
New York, N. Y.; London, Eng.; St. Louis, Mo.

TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG



MANUFACTURERS OF

CAST IRON SOIL PIPE AND FITTINGS



ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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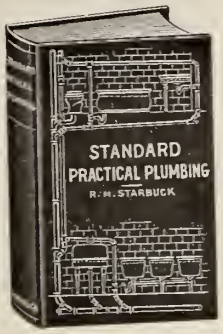

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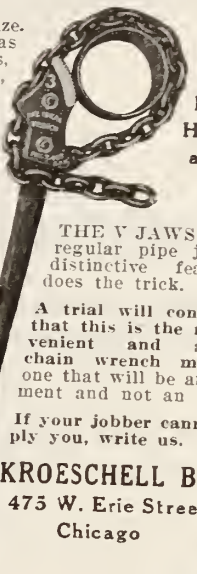

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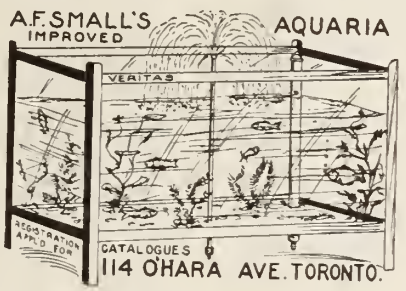

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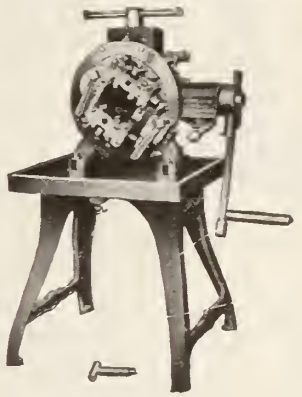

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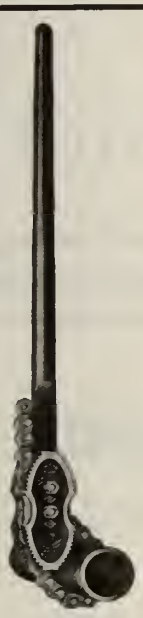

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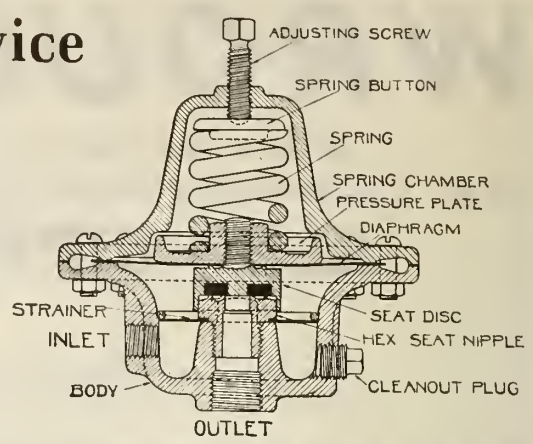

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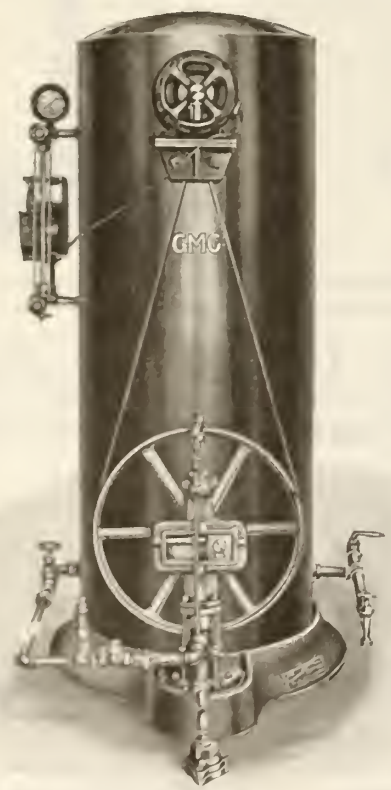

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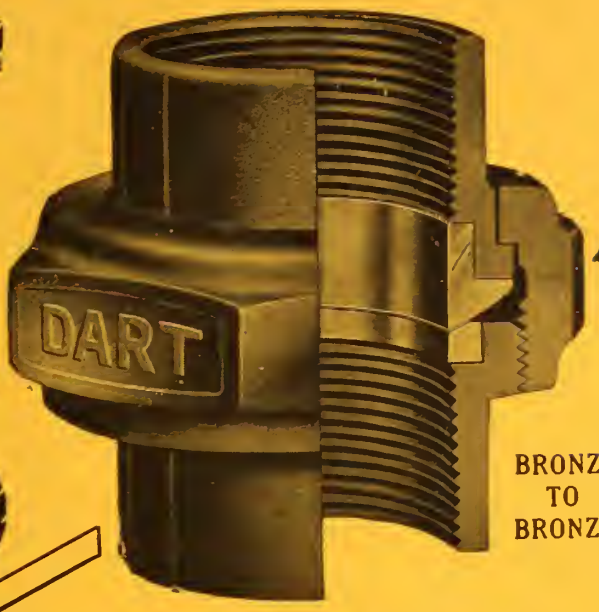

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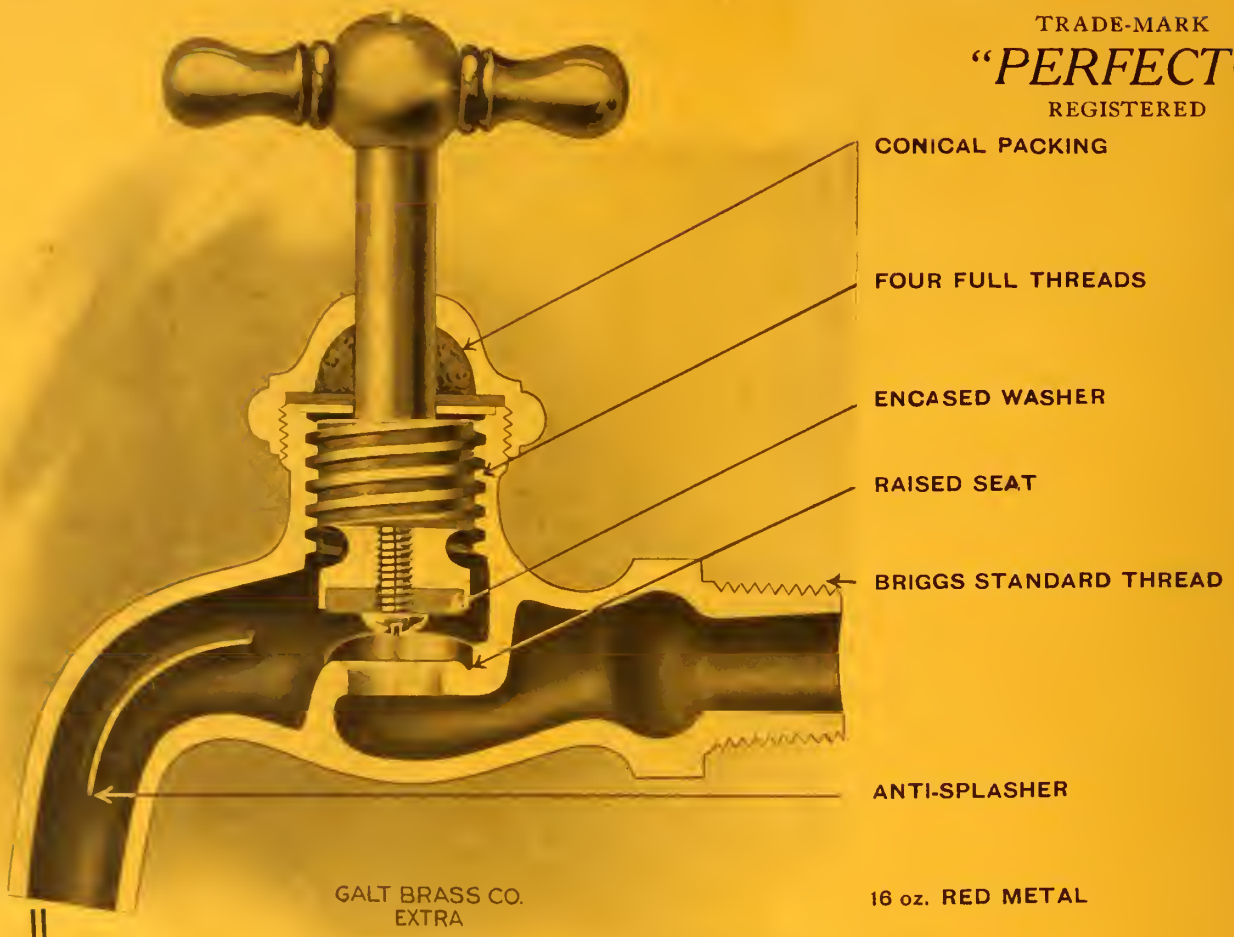

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Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

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Vol. IX | Publication Office : TORONTO, JUNE 15, 1915 | No. 12

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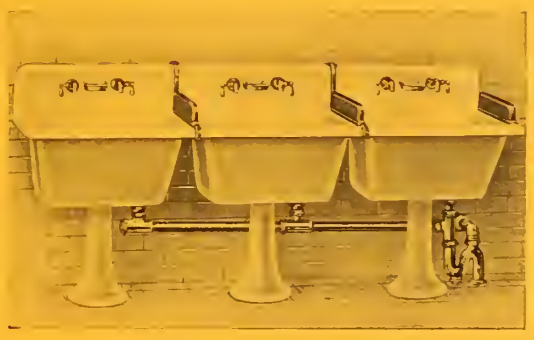

Length, outside—
1 section - 28 ins.
2 sections - 55⅞ ins.
3 sections - 84 ins.
Additional section - 28⅛ ins.

Plate F-365

Not illustrated in Catalog "F."

The Standard Ideal Company Limited

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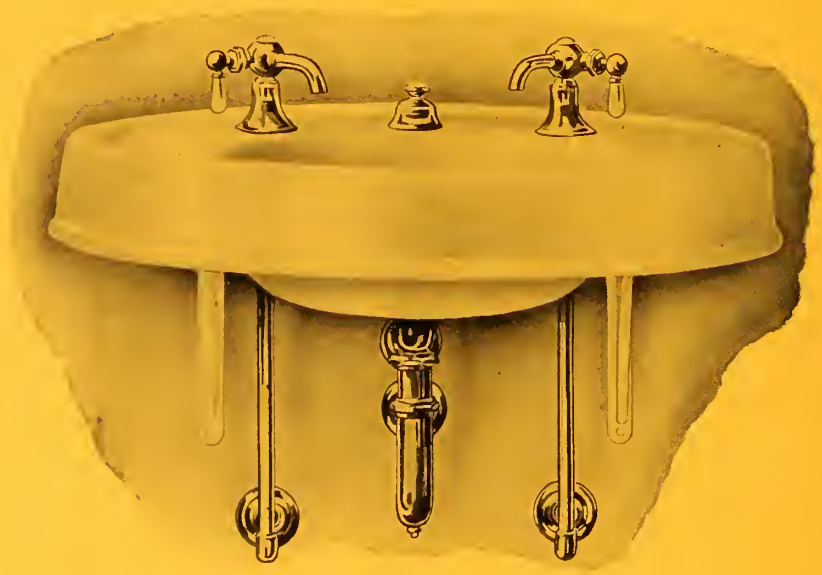
Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.



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Stationary Vacuum Cleaner

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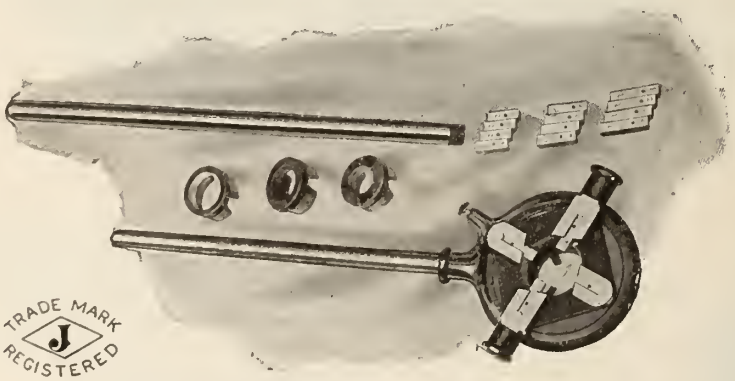

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" " " 8" " " 30 minutes.

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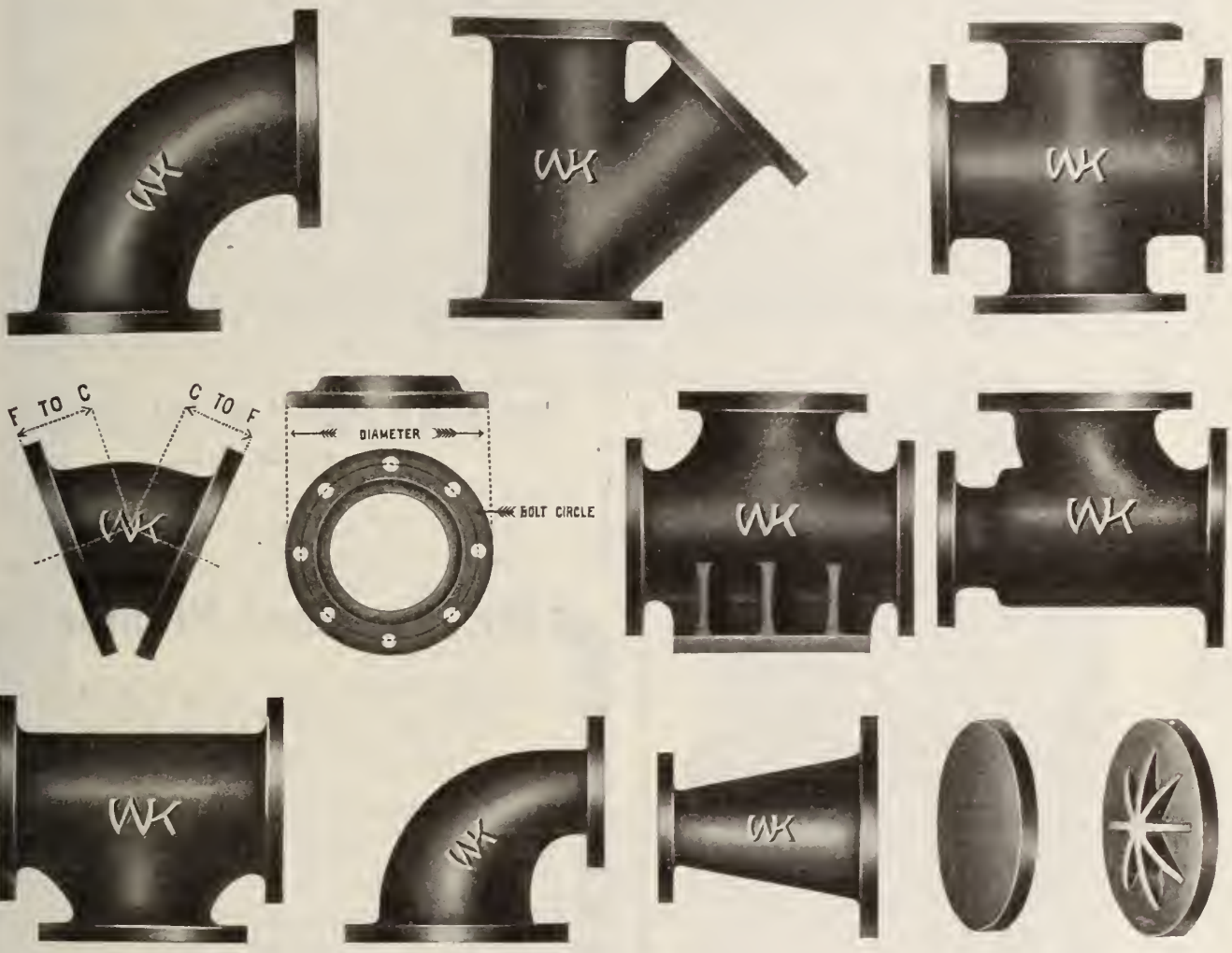

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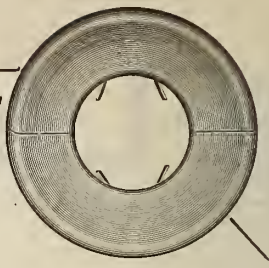

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Made from the best brass obtainable. Pressed shell and pressed brass base which eliminate danger from blowholes, which is a fault with cast bases.

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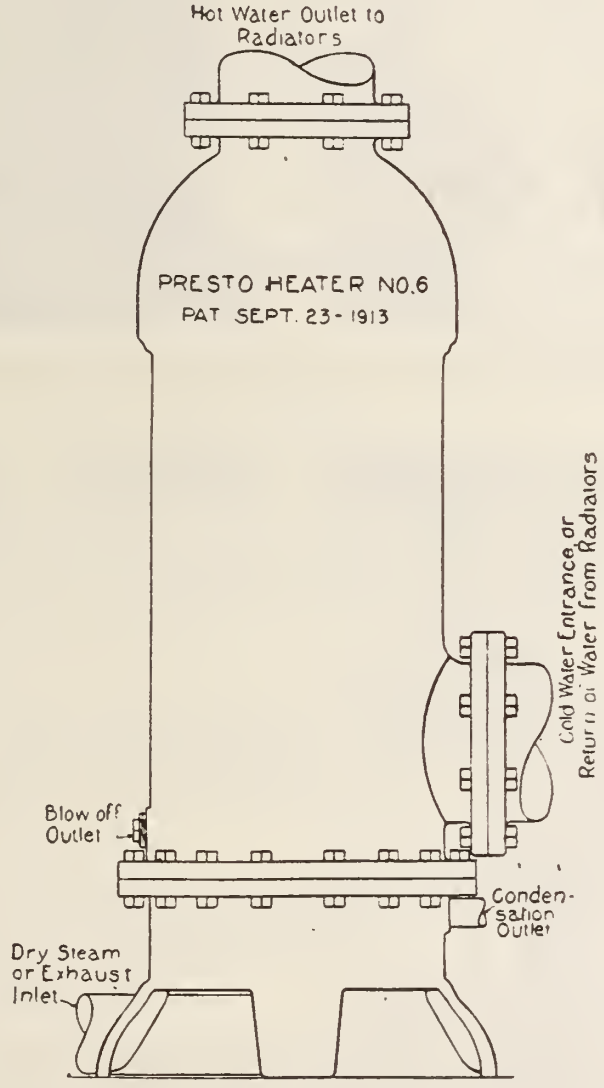
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PRESTO HEATER NO.6
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Blow off Outlet
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SANITARY ENGINEER

PLUMBER and STEAMFITTER of CANADA

Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, JUNE 15, 1915 No. 12

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EDITORIAL.

Co-operation—Recent Boiler Explosion—Be a Specialist—Seven Wonders of the World—Why This Exception?—Are Germans Interested—Editorial Briefs.

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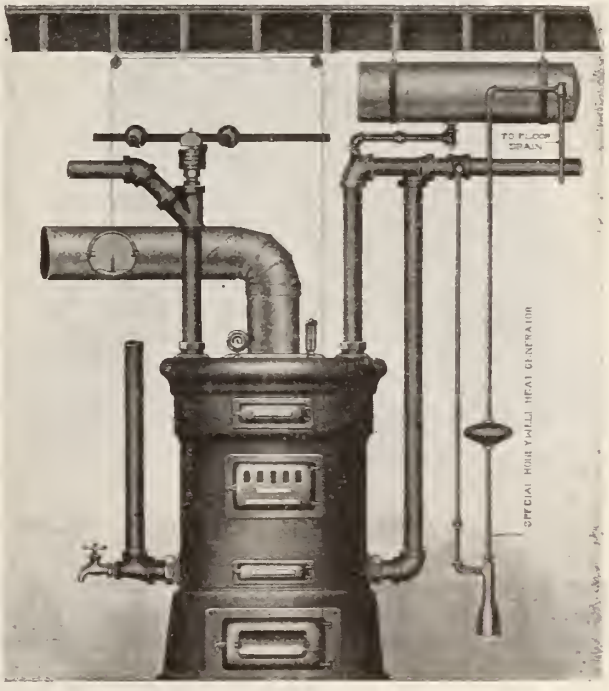

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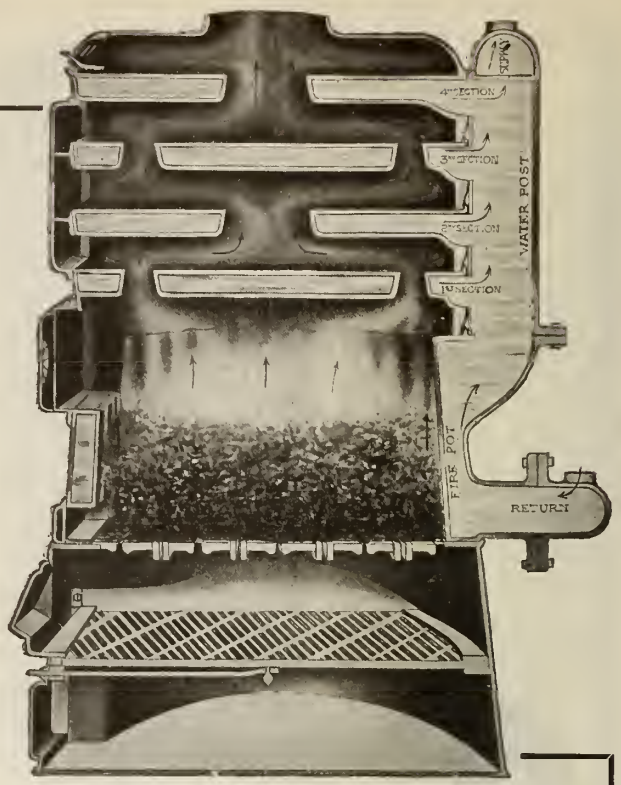

Sectional View "King" Boiler.

No. 6 High Base "King" Boiler with Double Shaker.

It tells the story and explains the *"King"* Boiler from ash-pit to smoke pipe.

We'd like to get together with you on this season's work and show you some of our practical plans for co-operating with you.

Our success as manufacturers depends on your success.

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Includes—"Royal" Round Steam and Water Boilers.
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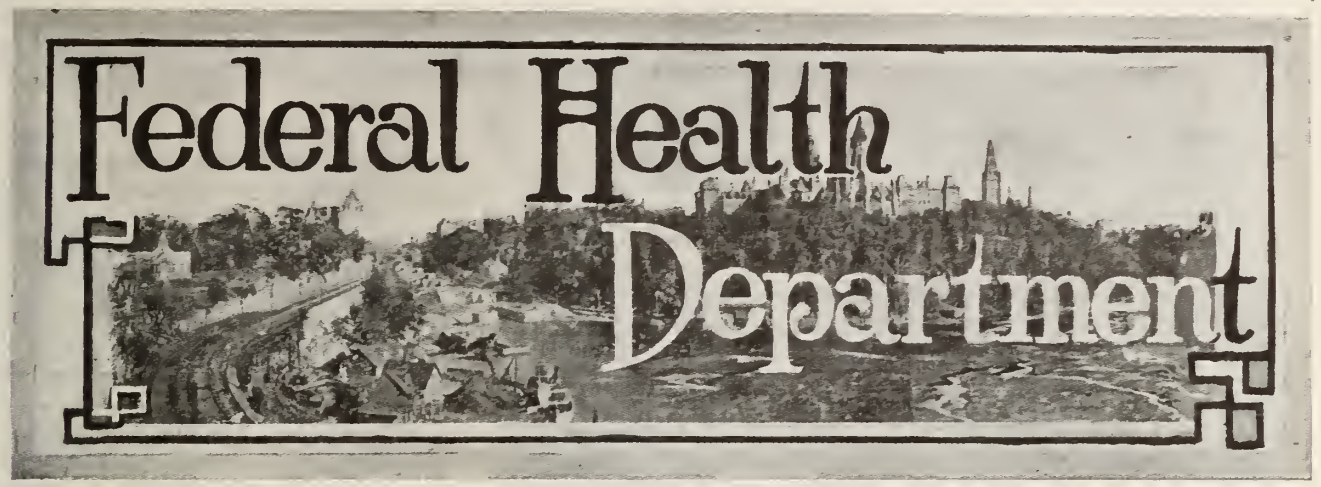
THE SANITARY ENGINEER

VOL. IX. JUNE 15, 1915 No. 12



THE subject of the public health is one in which every sanitary, heating and ventilating engineer should be more or less interested. And in these times, when business is not quite so brisk as it might be, it is one that should be thoroughly studied and discussed.

We have no by-laws which govern sanitation uniformly throughout the Dominion. What is permitted in one province is not tolerated in another. Our towns and city by-laws are the same; they lack uniformity. Some cities demand that every journeyman sanitary engineer shall pass an examination proving his competency. Others simply charge $1 for a license, and away the applicants go, full-fledged and authorized sanitary and heating engineers.

A great many towns and cities engage the man with the most civic pull to fill the position of plumbing inspector, and all kinds of shoddy work and poor constructions are the order of the day. Cities throughout the Dominion are wasting water because of poor quality brass goods, faucets, etc.

Sewage disposal plants are destroyed or overloaded with fluid because of water wastage. Millions of dollars are being wasted in pumping equipment at town and city waterworks, all in a vain effort to furnish an adequate pressure on water mains. Volumes of water are pumped in excess of reasonable requirements, but still this waste goes on.

Sewage Disposal.

Navigable streams, water ways and water supplies are being polluted wholesale. Farm surroundings and grounds in and around our country homes, wells, small reservoirs and lakes, are being polluted by irresponsible persons installing all manner of foolish contrivances called sedimentation tanks, septic tanks and cesspools. Some are fitted with what is claimed to be a syphon, when in actual fact those professing to know what a syphon is don't even know the first principles of syphonic action. Valves there are of various types, which are even poor apologies for the purpose to which they are applied. Some claim this and some that. Some say: "**Install one foot of 4-inch sub-surface tile to a cubic foot of contents in a tank**"; others assert that "**one foot of 4-inch tile is sufficient to take care of a gallon of fluid.**"

Then an allowance of anything from 15 gallons of fluid discharge of tank area per day per person to as high as 100 gallons per day per person is made.

To-day there are more farms and country residences being equipped with sanitary conveniences than ever before in the history of the country. But are these installations being properly put in?

We know a large portion are not, and why? Simply because there are no proper standards. Those who desire to establish standards and are working hard to give a square deal to each and every one of their customers are confronted with price. Everything is brought down to price; price prevails, and the people's property is being polluted. It is bad enough that cities and towns pollute our rivers, lakes, streams and navigable waterways, but it is infinitely worse to see the earth around our homes and the very wells that are bored being polluted.

Heating and Ventilating.

The very atmosphere, too, in our homes is being vitiated.

Poor heating installations are foisted upon the public, as it were, and why? Price again, price and polluted water, price and vitiated air. Readers, we want a Federal Department of Health, and we want one quick.

This war is killing thousands of our brave soldiers, and because we see the blood and hear the rattle of musket and the cannon's roar, we look in horror upon war and say war is hell, and so it is.

But while allowing wholesale slaughtering in our homes of the innocents, we are bringing up a weak, puny human race; we are breeding tuberculosis, diphtheria, typhoid germs, and a score other scourges. How and why? Because price predominates. We are building down to a price, not up to a standard, and thus we are at war with nature. God never intended that we should pollute water, pollute air, and pollute morals. He made it possible to live in the very best environments, but price pollutes and predominates.

The Panama Canal was not a great engineering feat; it was a simple application of common law. All the engineering in the world could not have built the Panama, had not General Gorgas said unto the earth: "Be thou clean," by applying practical plans of cleanliness in the Panama zone.

Ninety per cent. of the children that

ne under the age of seven years are the victims of diseases of a filthy nature.

One medical man stated not long ago that 75 per cent. of the deaths of persons under 50 years of age were caused by filthy surroundings. Such being the case, war sinks into insignificance in comparison to unhealthy surroundings.

The sanitary and heating engineer who does not know his business and who is installing inferior goods, inferior constructions, syphons that won't syphon, septic tanks that are cesspools, heating installations that not only do not heat a building properly, but even contaminate the air, which the inmates have to breathe, is guilty of acts of warfare. The country that neglects matters of health cannot be a strong country. Its people will be weaklings.

A Federal Department of Health would be able to cope with:

(1) The matter of pollution of waterways.

(2) Pollution of grounds caused by improper sewage disposal systems.

(3) Heating and ventilation engineering.

(4) Sanitary engineering.

(5) Examination of all persons engaged in the construction of sanitary and heating engineering.

(6) Appointment of provincial medical health officers, sanitary engineers and inspectors.

Pollution of Earth and Water.

These first two matters would, if properly handled, bring about the adoption of the best known methods of sewage disposal. Such a department would be of great value to every community.

Climatic conditions could be studied, which mean so much when devising ways and means for proper sewage disposal. Data could be gathered and given out to those interested in such matters. So-called septic tanks, which are not septic tanks, and all kinds of schemes which are being brought out to catch money, would then be abolished. Towns and cities would not be allowed to build hundreds of miles of sewers without proper provisions being made to sterilize these sewers.

Heating and Ventilation.

Third problem—that of heating and ventilation installations—is a subject which is too great for any municipal, or even provincial, authority to handle. Undoubtedly this is a matter which should be under a board of health. It is, firstly, a matter of health, and secondly, a matter of public safety. But there are thousands of cases of tuberculosis caused by poor heating and ventilating which bring death to hundreds of victims each year. As to safety, we hear of one or two explosions, which are hardly any serious and not by any means to be belittled. They could not occur if all heating and ventilating were under the jurisdiction of a board of health, which, again, should be a local department of the proposed Federal department of health. Local restrictions are good for the locality and tend to clean out the impractical, self-termed sanitary and heating engineer; but he becomes a migratory commodity and flies off to victimize a locality which has no such restrictions.

In that way the big towns and cities get rid of their botch plumber at the expense of the little towns. He can even step from one province to another. Thus it is clear that municipal or even provincial heating and ventilation by-laws are not sufficient; nothing but a Federal department can adequately fill the bill.

Sanitary Engineering Construction.

Under the fourth heading—viz., sanitary engineering—the same arguments apply as mentioned under the heading of heating and ventilation.

At this date, sanitary engineers throughout Canada are finding very little business in large centres. They are going further afield, they are getting work from the farmer and rural resident. But here again is a problem. Ninety-nine per cent. of the rural districts have no sanitary engineering by-laws, and the honest, practical sanitary engineers find they cannot compete with the rascals who pose as such, and who are responsible for all kinds of poor installations. The farmer is being advised by impractical men to install his own septic tank. Mail order houses offer to show the rural resident and farmer, too, how to install his own plumbing, all because there is no Federal department of health. Thus, again, we see the urgent need for such a department.

If Manitoba becomes sick, every other province throughout the Dominion suffers. When Ottawa was sick during those two typhoid epidemics every city in the Dominion felt the pain. Nature teaches us the lesson: then we should follow the laws of nature. We should inoculate commercialism with a few simple laws of nature, and thus create a peaceful and healthy commercialism.

Board of Examiners.

When we advocate a board of examiners, we mean a board to examine candidates for positions of county or provincial inspectors, of sanitary, heating and ventilation engineering, as well as to examine journeymen. This country of ours is a big country, and it is necessary that every man engaged in the profession of sanitary and heating construction should be qualified and authorized by some body of examiners to practise his profession in any part of our Dominion.

Under present conditions the position arises that a man may have passed some local board of examiners and proved his fitness to practise locally, yet because of the various climatic conditions, because of the vastness of our country, he can not always be kept tab of. He should be authorized, first, by a Federal board of examiners, and should be responsible to them for his actions wherever there happens to be no code of local by-laws for him to follow out.

Appointments.

A story is told of a Scotsman who was once asked to give a reason why Grits and Tories were always at loggerheads. He replied in something like this style: "Well, ye ken, it tak's the twa to mak' a government, jist as it tak's twa to mak' a hame; and when the twa get tegether, they're aye fechting wha should wear the breeks." No doubt Sandy was not very far wrong.

When Germany declared war and Canada saw that her duty was to assist the Mother Country, Grits and Tories buried 90 per cent. of their politics, just as a man and wife having a few words would not tolerate any interference from an outsider. The same spirit should predominate in matters of health. Disease and death do not favor the patronage system, and appointments should be made according to qualifications and general character. A person may be a splendid and properly-qualified man, yet not possess the necessary public spirit. He may not have the general welfare of the community at heart. Such a man would not in all fairness to either himself or the public be a fit person to fill the position of medical officer of health or sanitary inspector. The men filling those positions should have special personal qualifications so as to be of the greatest possible service to Grit and Tory alike.

A thousand dead Tories would not be half as much use to the country as one live Grit, or vice versa; and the most expert medical man or sanitary engineer would be of very little use if not endowed with the spirit of service in the cause of the public health.

NECESSITY OF MAKING GOOD.

It is incumbent upon every business man to make good — employer and employee.

"Make good or get out" is the unwritten law of business to-day.

Stern, it may seem at first glance, but instead, this unwritten law is full of hope. To the man who stamps it on his brain it is an opportunity to make good. Everyone can make good in some degree and the limit is set by ourselves.

An Address on Soil Pipe Fittings

One of a Series of Addresses Given to the Students Who Attended the Evening Classes on Sanitary and Heating Engineering. The Whole Session Proved to be of Great Interest and Was Well Attended.

By James Marr, Sr., Sanitary Expert, Member of Calgary Board of Health, and Advisory Board of Technical Education.

FROM what has been written, and what is being talked about at the present time with regard to the better system of soil and waste disposal in our homes and business buildings, it is quite evident to the man in the street that the sanitarian is very much at sea, being buffeted about between practice, theory, principles that have neither practice nor theory to recommend them, and something else that has the appearance of studied economy in the manufacture of fittings. What I may have to say on the subject may add still further to the conflicting puzzle, a puzzle which to my mind it is the duty of every professing sanitarian to try to solve, viz., the prevention of disease through faulty and defective methods of soil and waste disposal. My remarks to-night will apply principally to that part of plumbing work known as the rough plumbing.

Before proceeding to give you my thoughts on what I consider improvements on present principles it will be necessary for me to first point out what I consider the defects in our present practice and in the use of certain stock fittings.

I will take the T family for my example, as the T begat the Y, and the Y begat the T Y and so on.

The T connections as first manufactured by our foundries was faulty in design as it prevented the free flow of water when placed on the horizontal, was liable to capillary action when placed vertically, also to syphonage by momentum. The Y, while it removed the liability of obstructing the free flow, increased that of syphonage.

Now we come to what I call the hybrid of the other two species. Naturally it has the disabilities of its progentiors. It reminds me very much of the fellow who wants to vomit and someone holds his nose. Try it. I attribute the trouble to the design of such fittings as those mentioned.

You have here illustrated what I meant by holding your nose when you wished to vomit. Take the line through the section of the T Y at the crown of the branch you have a dip of 2 inches on the 4 inch pipe, which is meant to direct the water along the outflow, but, as you will notice, prevents a free flow of air along the crown of the horizontal pipe thereby increasing the liability of syphonage, hence a remedy had to be devised to prevent the syphon action on traps of the straight bore principle.

To overcome those troubles pipes of large diameter have been used, and are being used along with the smaller vent pipes which we have in different styles, viz., that of the crown, down from the crown, and away from the crown, all of which those of you who have been called on to do repairs find in practice a useless waste of materials and expense.

To carry a pipe of one diameter the whole height of a building forms a cylinder of straight bore. The water discharged into the cylinder forms a piston which acts in two ways. It propels by force the air in the pipes which must have an outlet and usually takes the road of least resistance—in many cases the seal of some trap. Again the length of that solid piston of water may be inches or it may be a foot. The piston covering the opening of a Y in a 4 in. pipe creates a vacuum on your

James Marr, Sr., Calgary, explaining his new model of soil pipe and vent fitting to the students of the plumbing class.

Side view.

branch, therefore, if you were to lengthen the opening the less risk there would be for that pull on your branch. Now what I have in mind is a rational remedy for these ills, and I will now try to describe it, and show that it is possible to eliminate most of the trouble by discarding some of our pet theories and applying a new principle which after my forty years' experience I know will work out in practice. Call it a new practice if you will, or a method of overcoming the present troubles of syphonage and compression. We must get to a normal condition of things whereby to set up our new standard and that, in my opinion, can only be reached by a balance of power, or, in other words, by maintaining an equilibrium.

This is the manner in which I propose to arrive at the solution of your troubles. The fitting which I have demonstrated to you takes care of the trouble from syphonage, permits a free flow of air through the pipes, reduces to a minimum the liability of chokage at branch connections and eliminates entirely the trouble from choked vents. It permits a free flow of air on a circuit granted the top of soil pipe is temporarily choked up, permits of smaller pipes being used at top, and the increase retards the velocity of the falling body at the break forms what I would call a parachute. I will call it that for want of a better technical term, the larger volume of air making greater resistance to the falling body spreading in the larger pipe. I think we have now arrived at that part of the work where only actual tests will put us in possession of the size of pipes necessary for standardization.

The photos and drawings will illustrate the style of fitting and the manner of installations.

Front view showing base.

ARE YOU BUILDING FOR PRICE?

By "One of Us."

One of the greatest sources of waste is of personal waste. We waste our energy, our thoughts, and our morals. The whole business world is wrong. Things are being bought for a price. Price is the dominant power, price is keeping down the highest standards and aspirations of our calling, "The man who only works for what he gets, only gets what he works for."

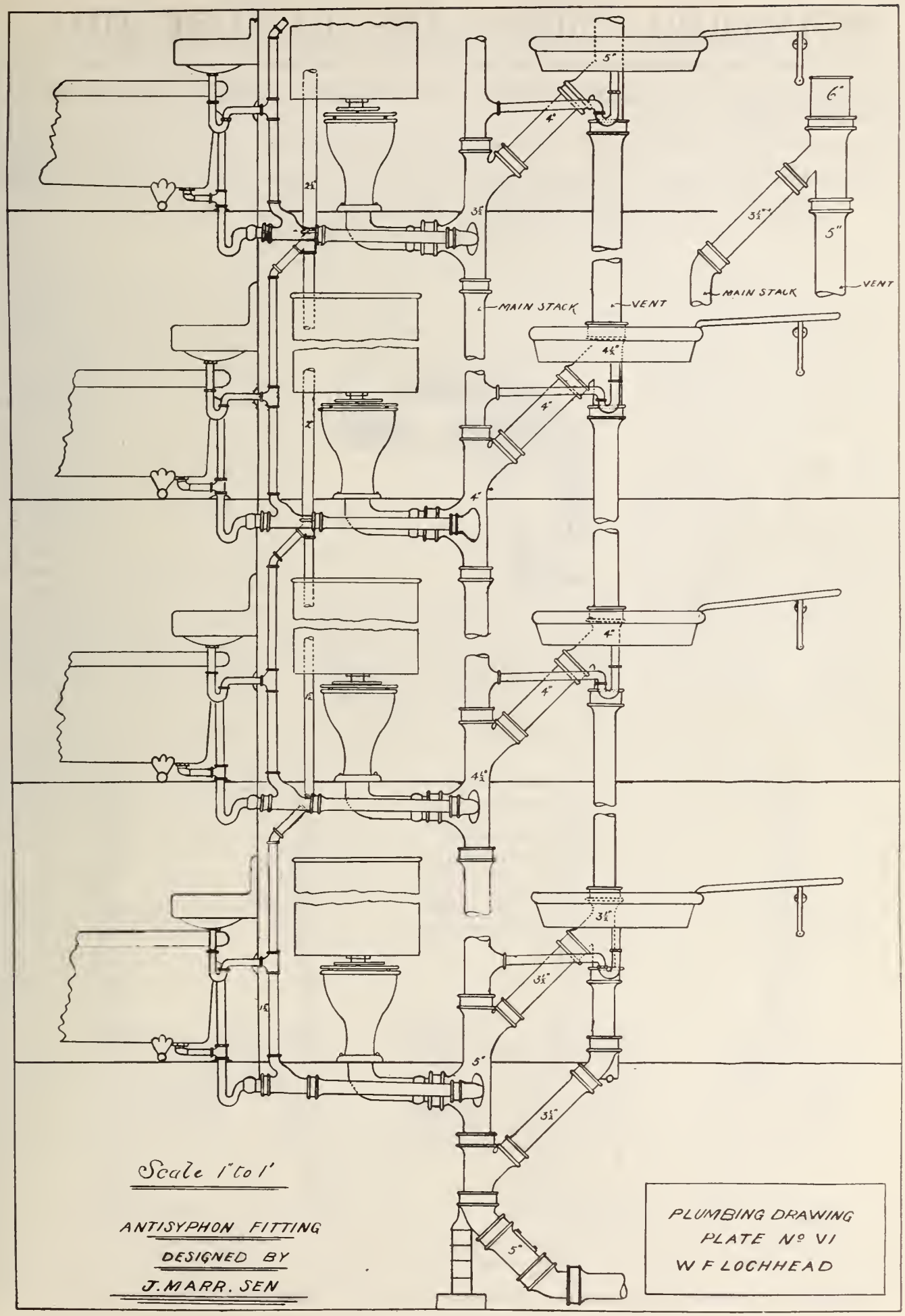
When I hear a man say that he's only getting "so much" a month, I begin to question whether he's worth any more. A man making such a complaint about his employer, is condemning his own abilities as a salesman, simply because he evidently does not know how to sell himself.

One time I had a man come to me for a situation, he was a fine looking fellow, with pleasant manners, and seemed to be making good. I had happened to say some time before to him, that I would require a salesman. As a result he asked me for the position. I was told he only had $800 a year and traveling expenses. What I wanted at that time was a $1500 man. I made enquiries about him, and what I learned was a surprise to me. That man drawing $800 a year salary, was a splendid salesman. But, it cost his firm $8 a day for hotel and sundry expenses, besides transportation. His employer knew this but so long as $800 salary was satisfactory, the firm did not complain. His employer had never been approached for an advance, and admitted that he was "a splendid salesman for them." Possibly, but was he a good salesman for himself? I think not. He was wasting his own money. He could have saved some of the $8 a day easily and received more salary.

Another question arises, are we building down to a price? Are we expecting to sell our abilities before we have developed them? Are we simply working for what we get? or are we working to get more? No man can sell a house before he has built it, and if he desires to demand a high price, he must build up to a high standard, not down to a price.

(Continued on page 18.)

Rear view.


MAIN STACK
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MAIN STACK
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Scale 1"to 1'
ANTISYPHON FITTING
DESIGNED BY
J. MARR. SEN
PLUMBING DRAWING
PLATE Nº VI
W F LOCHHEAD

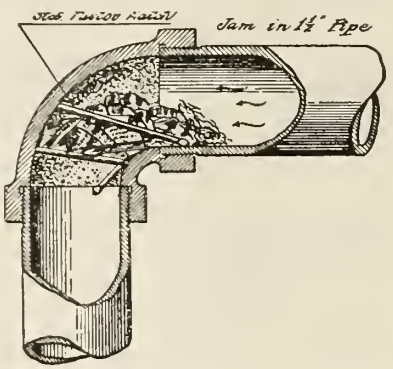
Sweeping Sidewalks in Toronto

Twenty-five people were each fined $1 in the Toronto Police Court recently, for sweeping the sidewalk without first applying moisture.

The Above is a Newspaper Clipping from a Toronto Paper—It is to Some Extent Rather Peculiar, and Certainly is Not in Keeping With the General Methods Adopted in Our Homes.

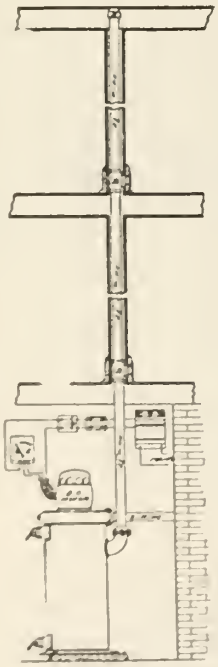
HERE are the facts about sweeping in the city of Toronto: It is a misdemeanour to sweep the sidewalks without first applying moisture, and further it is also illegal to sweep the floor refuse or dust from an office, store or factory into the street, whether moisture is put upon the refuse or not.

This is the law which is enforced in Toronto. The Sanitary Engineer endorses that law, every word of it. But what about sweeping the floors in the inside of the homes? Of course it is quite permissible to sweep one's own room up with a broom, and nothing said about it. If there is one thing more than another which should be abolished, it is the broom. If the Sanitary Engineer had its way every house would be properly piped and a stationary vacuum cleaner installed, just as every house must now be equipped with a w.c., etc. The stationary vacuum cleaner is the only thing. Of course we know there are quite a number of small portable

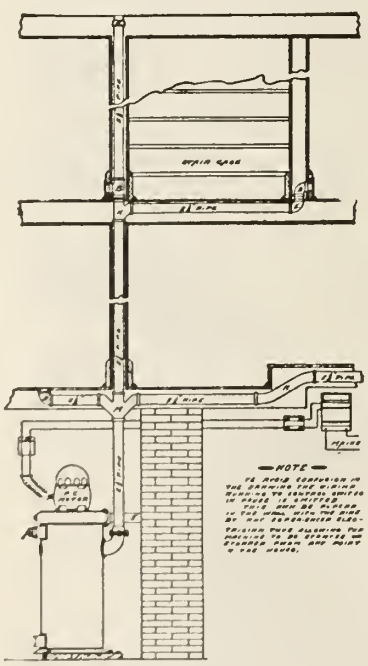


vacuum cleaners which are a great improvement over the broom, but these have to be bought by the householder, and every householder has not the means to buy such an appliance. The Sanitary Engineer contends that a vacuum cleaner is just as necessary as any other sanitary appliance, and should be a part of the house. No doubt if some speculative builders had their own way the tenant would have to install his own plumbing fixtures. It is bad enough having to install one's own electric fixtures. This latter means a lot of waste money. No house is complete unless it is equipped with every fixture which has to be attached to the building in anyway before it can be used. In conclusion we assert that as it is a misdemeanor, punishable by a fine, to sweep refuse from a building into the street, or sweep sidewalks, it should also be the same for sweeping the dust up in the home.

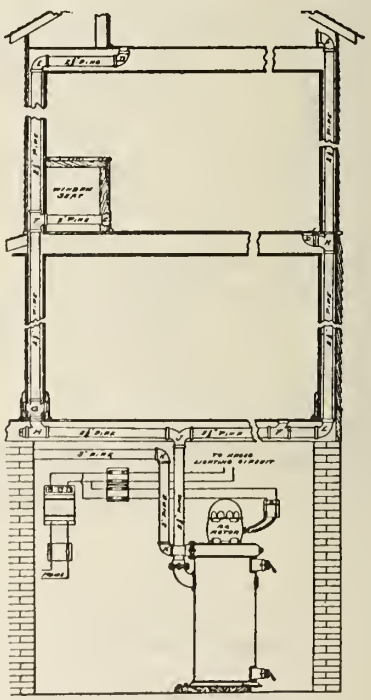
Dust, causes the atmosphere to become polluted, and polluted air is not fit for human beings to breathe. There are more cases of tuberculosis caused by persons breathing foul air than by anything else. The Sanitary Engineer has



For small house. Three outlets.



For medium-sized house. Five outlets.



For large-sized house. Seven outlets.

waged war against the roller towel, and the drinking cup. We will spare no effort until the broom is a thing of the past, and every house is by law equipped with a stationary vacuum cleaner. Dust is the silent sneaking death dealing germ, one which we do not realize, because of its silent operation. There are three women to every man sent to our hospitals for treatment. This comes to a large degree from the fact that women live indoors and breathe a dust-laden second-hand atmosphere which depletes their vitality. "Dust particles inhaled in the home are more dangerous than those breathed in from the street." says Dr. Jos. S. Neff. "This is because indoor dust is rarely subjected to the purifying action of light and the sun's rays." And yet in the city of Toronto, a city of half a million souls, the dusty sidewalks must not be swept unless that dust is moistened, while almost every housewife is allowed to commit slow lingering suicide by sweeping the germ laden dust of her home with a broom and by inhaling those germs by the million. Doesn't such a state of affairs seem ridiculous?

Half the World's Deaths Caused by Dust.

The Kingdom of Death is Dust. More than half of all deaths in the world are due to the distribution and the breathing of dust.

J. Gordon Ogden. Ph. D.

* * *

Indoor Dust Deadly.

Dust particles inhaled in the home are more dangerous than those breathed in from the street. This is because indoor dust is rarely subjected to the purifying action of light and the sun's rays.

Dr. Jos. S. Neff. M.D.

* * *

The Woman Suffers.

More women patients, three to one, are sent to hospitals than men. This comes in large degree from the fact that women live indoors and breathe a dust-laden, second-hand atmosphere which depletes their vitality.

Dr. Mayo, M.D.

* * *

Brooms Only Distribute Dust.

The benefits of sleeping out-of-doors will be overcome and neutralized if we spend our days in stuffy offices and homes that are swept by brooms and portables, where dust is distributed instead of being removed.

Dr. Tilden, M.D.

* * *

Carpet Sweeping Should be Abolished.

Statistics show that janitors and carpet beaters die from consumption like flies in autumn. They stand day by day breathing in germ-laden dust that the housewife knows she must get rid of if her family is to remain well. If they dropped over dead while beating the carpet, instead of months later, the practice of carpet beating would stop at once.

Dr. W. A. Evans, M.D.

* * *

Diphtheria, Whooping Cough, etc., Caused by Dust.

Children in arms are practically immune from the diseases common to childhood—diphtheria, whooping cough, measles, etc. Only after the child begins to creep over the rugs, carpets and on the floor, where are found the foul air and disease germs, does he contract such ailments.

From an address by Dr. Jacobi before the American Medical Association, Atlantic City, 1909.

INTERESTING DEVICES FOR HEATING AT PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

As a result of the introduction of new and original methods of heating for all purposes during the past few years, the thousands of persons visiting the Panama-Pacific International Exposition at San Francisco are being accorded a liberal and useful education by the manufacturers of apparatus and processes in a field of endeavor especially interesting to the ordinary home-loving individual.

Every appliance calculated to improve the heating and ventilating facilities of the home, factory or other building, is exhibited within one or more of the huge palaces. At least every modern device or system of merit has been installed, and owing to the tireless energy and efficient efforts of Captain Asher C. Baker, U.S.N., retired, director of exhibits, scores of appliances, deficient in merit, are not included.

The appliances furnishing heat for all home purposes constitute a majority and are attracting the attention of thousands of men and women who pass along the aisles of the palaces, especially in the Palace of Manufacture. It matters not whether the visitor resides in a modern city home or hundreds of miles away from gas, coal and electricity, the appliance is exhibited which will fit nicely into the general scheme of domestic science of any particular home.

Ideal methods for heating every description of building from the ordinary cottage to the big factory or office building are exhibited. A wide variety or range of furnaces attracts the attention of the manufacturer who is preparing to equip a new plant, the engineer or architect who is planning an office building, or the head of a small family who hopes to build a home in the near future—or perchance install a system in his present home.

The visitor may have been under the impression that a furnace is a furnace, and that all he has to do is to order the apparatus from the first dealer or plumber he chances to meet. He now discovers that the question of efficiency is an important one. He learns that the British thermal heat unit figures largely—that, although the various furnaces may "look alike," a difference in construction may mean a vast difference in the number of heat units obtained from each with the same amount of fuel consumption.

If he already owns a furnace—and it may heat the home or building with either steam, hot water or hot air—he may discover that a superior furnace will develop nearly 9,000 British thermal units from a pound of coal, while his own obsolete equipment wastes a considerable percentage.

The exhibits of furnaces indicate that the effort of each manufacturer has been to increase heat obtained from a given amount of fuel. One manufacturer exhibits a new crude oil burning device in the Palace of Machinery which effects a considerable saving in fuel. The device is operated by an electric motor and the motion ejects a mist of oil and air from numerous vanes of a propeller and perfect combustion results.

The attendants in charge of the hot air furnaces indicate by figures that this system not only heats the building, but also supplies a constant supply of fresh warm air, and thus provides for the problem of ventilation.

Several methods of ventilation are exhibited in the Palace of Machinery. Some of these ventilate by exhausting the air from a room, as in the case of a model of a gas burning radiator. The air mixed with the gas is burned, and then drawn from the room and sucked away through pipes, the suction consisting of a fan driven by a motor.

Every possible contrivance for the heating of water for domestic purposes is exhibited. These range from the big plant used in large buildings to the handsome and polished device which acquires its heat from an electric current. After visiting these booths and observing the ease with which hot water may be obtained, the housewives who have always depended upon the ordinary kettle are apt to insist upon the installation of a heater in their home.

The introduction of electric cooking and heating devices into the home has only come into prominence during the past few years, and but few persons possess any knowledge regarding the new phase of domestic drudgery elimination—or the cost of operating the same. A complete line of these appliances is

exhibited and complete data are at hand regarding the cost of operation.

Numerous accessories to heating and ventilating are exhibited in scores of booths. These include measuring and registering apparatus, ordinary and self-registering thermometers, pyrometers, anemometers, regulators of temperature, of draft, of pressure, fittings utilized in connection with heating systems. Then there is a wide variety of fittings for chimneys, including dampers, flue stoppers, special sheet iron chimney ports, openings for hot air and ventilation, gratings and plates.

The heating exhibits are perhaps more numerous than any other line installed at the exposition. Not a phase of this branch of manufacturing has been overlooked and the result is that thousands of persons are now acquiring information which will result in improving the methods utilized in their homes.

ASSOCIATED ADVERTISING CLUBS OF THE WORLD.

Chicago will be the scene of the eleventh annual convention of the Associated Advertising Clubs of the World, which meets June 20 to 24. This great gathering of the dynamos of the business world to discuss common problems and to advance the banner of truth in advertising promises to hold a unique place in the events of the year.

President Wilson, war conditions permitting, will head the list of speakers. Hon. William Jennings Bryan, John H. Fahey, president of the Chamber of Commerce of the United States; Henry Watterson, George Horace Lorimer, editor of the Saturday Evening Post; Arthur Brisbane and Elbert Hubbard, are among others of national prominence who are to address the sessions. On the Sunday preceding the formal opening of the convention, fifty business men of country wide reputation will deliver lay sermons in Chicago churches.

New features include a conference of the teachers of advertising and another of the secretaries of advertising clubs. Departmental meetings of men in the several fields of work give opportunity for a discussion of the problems of various phases of advertising, an arrangement which reflects the new freedom in business.

Amusements include a list of social functions for the ladies, a Gridiron Show to be staged by one hundred and fifty Chicago men, lake and automobile trips. At present, a whirlwind campaign is being waged by advertising clubs in an effort to mobilize in Chicago at full war strength.

Note.—Since the above announcement reached us we regret to have to mention that one of the speakers, Elbert Hubbard was one of the victims on the Cunard Liner Lusitania. The whole world is poorer because of the loss of Elbert Hubbard.—Editor.

PREPARE FOR THE BOOM.

Thomas A. Edison, America's wizard of invention, was recently interviewed by the New York World, and when he speaks his words are always closely followed. Mr. Edison spoke of "worry" and of "the European war and the effects of both on business in this country."

"It has surprised me to see how Americans have become weakened over this war. They seem to be stricken with a sort of commercial paralysis. They want to get out and do something. Now is the opportune time.

"You can put a building up cheaper to-day than you could before the war, and yet many of our supposedly good business men will wait until it is over as a sign of prosperity and pay more for the building. The wise man will prepare now for the boom in trade that we will soon experience and which will be tremendous after the war."

Here is the best possible piece of advice from the best possible source. "Worry" is a business killer and a cheerful disposition is an asset that has made many a man wealthy. As for the war, heed what the wizard has to say: "Prepare now for the boom in trade that we will soon experience and which will be tremendous after the war."

ARE YOU BUILDING FOR PRICE.

(Continued from page 14.)

The business world is pandering to the people for price, low price at that. The public does not know what is best for them. They judge by the price. The manufacturer, the sanitary engineer and the publisher should raise the standard of their products, so as to be of the best value for the public. A piece of shoddy is seldom worth 50 per cent. of the price the public pays for it, because it is woven down to a price. Seventy-five per cent. of the plumbing and heating systems in existence have been installed down to a price.

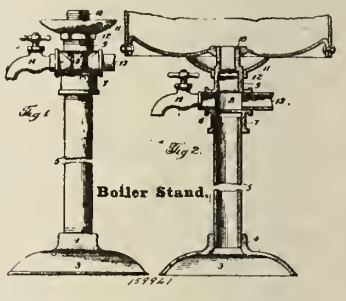
Fifty per cent. of all the printed matter is mere piffle, because it is printed for price. The only remedy for these evils is, that every person should not let price be the ruling element in any thing. Inspiration, love of calling, and pride of product with price as secondary matter, should be the rule. Build up to a standard not down to a price, remembering that the man who only works for what he gets, only gets what he works for. Get busy.

CANADIAN PATENTS.

William Hawks, Duluth, Minnesota, U.S.A., 5th January, 1915; 6 years. Filed 4th September, 1914. Receipt No. 242,865.

Claim.—1. A boiler stand comprising a lower supporting portion, connected to the upper part thereof, a tee having a transverse portion for connection with a supply pipe and a drain valve and an upwardly extending portion arranged for connection with the bottom of a boiler and to afford communication with the boiler, and a flange on the upwardly extending portion of the tee arranged to engage and support the bottom of the boiler.

2. A boiler stand comprising a lower supporting portion, connected to the upper end thereof, a tee having a transverse portion arranged for connection with a supply pipe and a drain valve and an upwardly extending exteriorly threaded part, a nipple extending there-



from and arranged for connection with the bottom of a boiler and to afford communication with the boiler, and on the exteriorly threaded part of the upwardly extending portion an outwardly extending flange arranged to be screwed against the bottom of the boiler and to afford a support therefor.

3. A boiler stand having its upper end adapted to be connected to a boiler and having in its lower portion a conduit arranged to be connected at one end with a supply pipe and at the other end to lead into the boiler when the stand is connected thereto, and on the upper portion of the stand an outwardly extending flange arranged to be screwed against the bottom of the boiler and to afford a support therefor.

4. A boiler stand comprising a tee having a transverse portion arranged for connection with a supply pipe and a drain valve and an upwardly extending exteriorly screw-threaded portion having extending above its threaded part a smaller exteriorly threaded nipple arranged for connection to the bottom of a boiler at its centre, and a bowl-shaped outwardly extending member on said threaded larger part of the upwardly extending portion arranged to have its outer edge turned against the bottom of the boiler in the vicinity of the centre around the nipple.

The Event of the Year

The Sanitary Engineer's Last Call

Come Along!

As a final call we are asked to convey a hearty invitation to every member of the craft to the coming convention. There is lots of hard work to do, the various committees will have the result of their year's labor in good order, so as to get all business matters dispensed with as early as possible. The president promises that, weather permitting, the visitors will be accorded the time of their lives. Every one should make a special effort to be present at this, the 20th Anniversary of the National Association of Sanitary and Heating Engineers.

The Dates: June 22, 23 and 24, McLaughlin's Building, St. John, N.B.

Beauty spots in and around St. John, N.B. This year's convention city.

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Circulating amongst Sanitary, Heating and Ventilating Engineers, Gas Fitters, Sanitary Inspectors, City Engineers, Boards of Health, Architects, etc.

JUNE 15th, 1915

Be a Specialist

THIS is the day of the medical specialist, the legal specialist, etc., etc. Why not the sanitary and heating specialist?

One of the main reasons is, that the craft have pandered and are pandering for price. If a speculative builder demanded one size too small a boiler, and 10 or 15 per cent. too little radiation, he would be given just what he asked for, so long as he paid the price.

Suppose a physician prescribed a certain quantity of several drugs for one of his patients and the patient replied "that he was paying the piper and he'd take just what he pleased." What would the outcome be? Possibly a corpse. Yet that is just what sanitary and heating engineers are doing. They are building for price. They are installing what the specification calls for, and no questions asked.

Now what we want to do is, become more efficient. Prescribe what is required and take full responsibility. Build up to a standard, not down to a price. Assist the rising generation to become more efficient, more dignified, and see that they are imbued with the spirit of justice and fair dealing. See that every apprentice devotes at least two half days a week to technical education. If there is no technical school in your town, encourage every apprentice to take up some course of study. Assist him to pay for the course in some way. Then as time goes along, he will become a specialist and an honor to the craft. He will imbibe the spirit of good, sound business management, and e'er another decade, we shall see our sons carrying on a trade or profession which is not the butt and joke of every man on the street. Be a specialist in sanitary and heating engineering construction.

Recent Boiler Explosion

IT has come to our notice that a few irresponsible persons have inferred that the recent boiler explosion may possibly have been caused by some other cause than that stated in the last issue of The Sanitary Engineer. While we hold no brief from any manufacturer, jobber or even reader, we can assure every one of our readers that there can be no reflection whatever cast upon any of the goods installed. The materials used in every respect were up to standard. It was absolutely a matter of careless construction.

If more care had been exercised, if practical men had had charge of the job, this accident would not have occurred. Of course such a thing could have been the result of an oversight, but would any of our readers excuse a fitter if he plugged up a safety valve on a steam boiler? That is just what happened in this case.

Some few persons seem to favor a safety valve on hot water boilers to avoid a recurrence of such an accident. The Sanitary Engineer would not advise any such thing.

For instance, a safety valve if fitted on a hot water boiler would be set at a fixed pressure and the chances are the pressure would never reach such a point in ten years. The result would be that the safety valve would become stationary. It would get stuck and dangerous.

Further, in spite of there being a safety valve connected, it would in any case require an expansion tank, then why in the name of common-sense not connect the expansion tank to the boiler properly, that is all that's required as far as construction goes. The most vital matter is, how to prevent a repetition? By simply allowing none but practical men to install such work and by bringing some law into force which will require these men to pass some practical examination. Until this is done, boilers will explode and thousands of tons of fuel will be wasted.

The Spirit of Co-operation

THE spirit of co-operation is abroad. Business men are co-operating. Men in all walks of life are being filled with the spirit of co-operation. Nation after nation are co-operating in an endeavor to bring this terrible war to a successful climax. The British and all British-speaking people are co-operating with their Allies in a fight for freedom. Man is fighting militarism for the mastery. God has no part in the spirit of militarism, therefore He will be and is with man.

Businessmen are co-operating; they are trying to create business. They are trying to interest the farmer and rural resident in sanitary and heating appliances, by advertising direct.

What will be the outcome? New business will be the result. The craft will receive this new business. It will result in many inquiries.

What the sanitary and heating engineer should do now is, co-operate, use some printer's ink. Let

the farmer and rural resident know that you can install any make of goods they require, any line of boilers or radiators, or any pneumatic water system.

More co-operation. The manufacturers and jobbers can't be successful if the sanitary and heating engineer is not. If one branch suffers all the rest suffer also.

The trade should find out just what manufacturers and supply men are doing in the way of creating new business and join in the good work. It is a matter of mutual co-operation.

The Metal Situation

METALS are still the centre of interest in the hardware markets and many sudden changes have taken place in quotations on hardware products during the week. Many of the price advances were not unexpected owing to the recent developments in metals, and the fact that these developments have a direct bearing on many hardware products. Spelter is still the chief sensation and continues to make records. Products into which spelter enters are being affected in every direction and among the many lines affected this week are galvanized sheets, galvanized pipe, sheet zinc, fence wire, fence staple, poultry netting, wire rope, and many other lines. Spelter is now quoted at prices which beat all previous records. Lead has been very much in the limelight for the past two weeks, after a long period of quietness and although stiff advances have been made further advances are looked for. The advances in lead have caused advances in sheet lead, lead pipe, pipe fittings, dry white lead, lead in oil, red lead, shot and other lines. Tin is in strong demand, and copper is still booming. The general situation remains much the same as last week, there is no diminution in the demand for metals used in making munitions of war and it is impossible to say where prices will end. It is freely stated that makers of galvanized sheets are losing money at present prices and that sheets should be 1c to 2c per pound higher than they are at the present time.

Are Germans Interested?

FOR some time past the whole trade has been watching with some degree of alarm the development in spelter. The market has been soaring and record-breaking prices have prevailed, in fact the market is almost at a standstill and large inquiries from galvanizers are few. As a result of the continued high prices many hardware lines have advanced in price at a rapid rate during the past few weeks. Large buyers of spelter in the United States are backward in coming forward. There are rumors going the rounds in the leading metal centres in the United States to the effect that German interests are buying up supplies of spelter in order to keep it away from the ammunition makers, and it is claimed that there is evidence to the effect that very large purchases have been made by firms who do not regularly use spelter themselves and who are known not to hold any war contracts. It would be very interesting to know what these firms intend to do with the spelter they have purchased. It is well known that Germany cannot stop the exportation of ammunition from the United States to the Allies, but she may try to secure control of large quantities of raw material needed for ammunition making and thus try to limit the exports to enemies. Reports are circulating that German interests have been trying to secure control of some of the largest gun and ammunition works in the United States and it is quite possible that she has been working through agents in buying up spelter—a very important metal just now. One thing is certain, Germany cannot control the spelter situation by adopting measures of this kind. The British intend to have all the ammunition they require, regardless of cost, and can over-bid Germany on any needed supplies. The greatest danger lies in the fact that the American consumers are the real sufferers. Referring to this American Metal Market, one of the leading authorities in the United States, says: "The real sufferer is the American consumer and it may be part of the German program to make matters so bad for our users of spelter that our Government will be induced to put an embargo on the exports of spelter and spelter products, including brass goods. We cannot imagine conditions becoming so bad as to warrant such an action, but if it should happen by any chance it would knock the spelter market into a cocked hat, as we are producing nearly twice as much spelter at the present time as we are using for our own industrial requirements. If an embargo was placed on the metal it would be dear at 6c per pound."

Before the war, the world's three largest producers of spelter were as follows: First, Germany; Second, Belgium; Third, United States.

The Seven Wonders of the World

The man who will work without being watched.

A sales manager who doesn't think he pays the old man's salary.

A salesman who thinks that perhaps the quality of the material may have something to do with his making those large contracts.

A stenographer who knows punctuation, and will look in the dictionary when she is uncertain about the spelling.

A purchasing agent who doesn't think he does you a favor when he asks you to quote.

A new superintendent who will wait a week before installing a much better system than his predecessor.

A boss who acts as if he wasn't.

—*Elbert Hubbard.*

Editorial Briefs

EVERY TIME a man gets the best of a bargain he calls it a bit of good business, but when the other fellow gets the best of it, it's a bare-faced swindle.

* * *

SUCCESS COMES to the man who does not fear failure. Be a worker, not a shirker.

* * *

THE MAN who studies "excuses" for his failure, would be better to study "reasons" for it, then go to it and eliminate the reasons.

* * *

A MAN IS never a complete failure until he has lost faith in himself.

* * *

THE SAME argument applies with the craft. There are just as great opportunities to make fortunes as ever there were, providing we fight fearlessly, fair and faithfully, and with unity.

* * *

SO BE ON hand at the St. John Convention. Assist in the good work, and success for the whole trade will then be assured.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 5.

OF certain contagious diseases, like smallpox, measles, scarlet fever, the organisms have never been discovered. They are probably so small that they pass through the finest filters and too small to be seen by the strongest microscope. Neither can they be made to grow outside the body, so that they can be studied. This brings us to a brief discussion of the methods generally used in studying bacteria.

In order to study the characteristics of any kind of bacteria it is necessary to separate them from other bacteria with which in nature they are generally associated. To do this it is necessary to remove them from their natural surroundings and provide them with an artificial food medium on which to live. This food medium must first be sterilized to kill any other bacteria in it. Sterilizers, such as previously described and shown in Figs. 6 and 7 may be used. All glass test tubes, plates, instruments used must also be thoroughly sterilized.

The kind of food medium used should resemble as closely as possible the natural surroundings of the bacteria to be studied. Blood serum is often used, but it is hard to prepare and preserve. A watery extract of meat is the common basis for most media. By adding gelatine or agar to this extract a transparent solid medium is obtained in which growths can be easily observed. Each bacterium is held apart from others by the hardening of the gelatine, and if allowed to grow at a suitable temperature each bacterium will produce in a few hours a "colony" which is easily seen without a microscope. We have already noted at what a remarkable rate a single bacterium will multiply.

The number of colonies that grow indicates the number of bacteria originally added to the media. Such artificial growths are spoken of as "cultures," and when only one kind of bacterium as "pure cultures." Bacteria may be grown in a shallow glass dish of about 3½ inches diameter called a Petri dish. Such cultures are known as "plate cultures," and this is a common way of growing bacterial colonies.

As we might expect, some bacteria will grow in media that will not support others. There are many culture media and various methods of cultivating bacteria, the technique for some of which will be more fully discussed under water analysis.

Bacteria are generally grown at one of two temperatures, at 20 degrees C., room temperature, or at 37 degrees C., blood or body temperature. The pathogenic bacteria naturally grow best at body temperature (while 20 degrees C. is the natural temperature for many others). Gelatine, in which some bacteria grow best, melts above 37 degrees

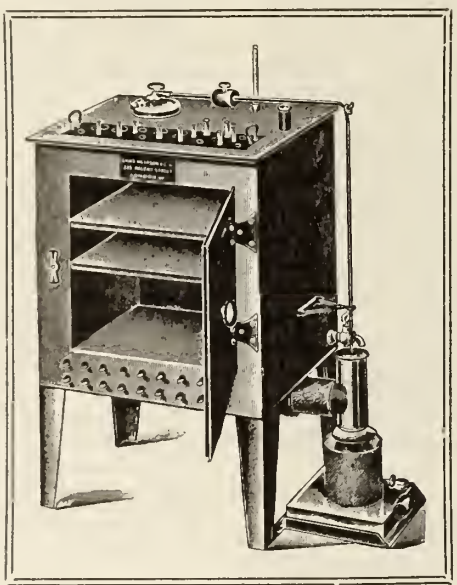


Fig. 10.
Biological Incubator.

C., and so it can only be used for growing at 20 degrees C., at which temperature it is solid. Agar, a gelatine of vegetable origin melts at 98 degrees C., and is consequently suited for growing bacteria at body temperature. It is now, in some laboratories, used exclusively.

If cultures are grown at 20 degrees C., they are left at this temperature for 48 hours, but if at 37 degrees C., for 24 hours, as at the higher temperature, the bacteria multiply more rapidly. The resultant colonies, especially of the pathogenic bacteria, rarely exceed 1/10th of an inch in diameter. This is accounted for by the fact that they may use up all the food supply near them, but more particularly because they produce poisons which prevent further growth. Just as people in a crowded room become uncomfortable on account of their exhalations, so are the bacteria harmful to one another on account of their toxins. Practically all of the pathogenic bacteria produce colonies that are whitish or uncolored, but other bacteria may produce brilliantly colored colonies of red, blue, green or yellow.

It is very important in cultivating bacteria to keep the temperature constant. Incubators with double insulated walls and thermo-regulators of various kinds are used. To keep a constant temperature of 20 degrees C. cool running water or ice may be necessary. Fig. 10 shows a small copper incubator heated by a lamp and fitted with Hearson's patent regulator for maintaining a constant temperature.

Bacteria show certain characteristics in the way they grow in artificial media. Further information is obtained by taking a small portion of a colony and observing it under a miscroscope. To allow them to be more easily seen and studied, bacteria are stained with different analine dyes, which shows up different parts of the baeterium. The small organs of motion, the flagella, can thus be seen that otherwise would pass unnoticed.

Air.

We now come to a discussion of the air in its relation to the sanitary engineer.

The whole mass of fluid, or air, surrounding the earth is termed the atmosphere. It comprises one-millionth of the total weight of the earth and extends from 40 to 50 miles above the earth's surface, decreasing in density as the height above the earth increases (see Fig. 11). The greatest density is at the earth's surface, and if the air does extend over 50 miles in height it is no doubt then so rare that for practical purposes it does not exist. Air, like other gases, is compressible and the weight of the air above causes the air at the earth's surface to be most compressed and consequently most dense.

Air resembles water in that it exerts pressure not only downwards, but equally in all directions. At a point about three and one-half miles above the earth's surface (see Fig. 11) there is one-half of the total weight of the air above and one-half below that point.

The pressure there is consequently only one-half that at the earth's surface and the air is only one-half as dense, or, in other words, weighs only half as much as at the earth's surface. At sea level the normal pressure of the air is 14.7 pounds per square inch, and a column of water 34 feet high or of mercury 30 inches high gives the same pressure. The height to which mercury rises in a barometer is an indication of the pressure of the air at any point. The barometer under the same atmospheric conditions falls at a rate of about one inch per thousand feet of ascent, and is a means of measuring the elevation above sea level. It should be noted, however, that due to weather changes the barometer may at the same point indicate from time to time a difference of nearly 2,000 feet. In storms air generally rises and

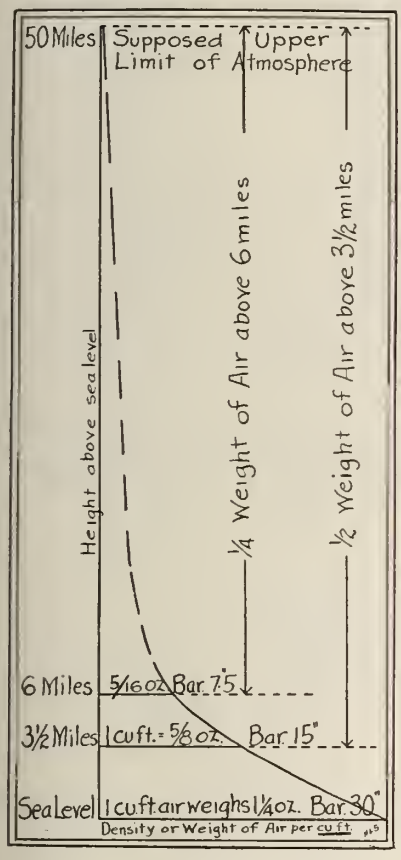
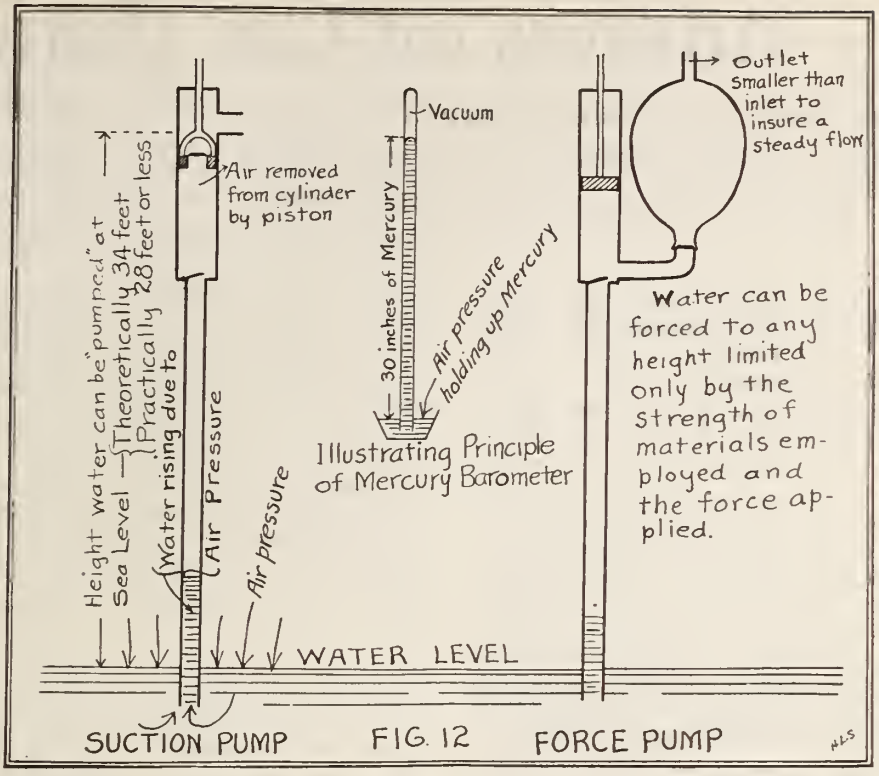

50 Miles
Supposed Upper Limit of Atmosphere
Height above sea level
¼ Weight of Air above 6 miles
½ Weight of Air above 3½ miles
6 Miles 5/16 oz. Bar. 7.5
3½ Miles 1 cu ft. = 5/8 oz. Bar. 15"
Sea Level 1 cu ft air weighs 1¼ oz. Bar. 30"
Density or Weight of Air per cu ft.

FIG 11.

Diagram showing distribution and weight of air above the earth's surface.

reduces the pressure allowing the mercury to fall. In calm weather the air falls and causes the mercury to rise in the barometer.

The reason we do not feel the weight of the air is that we ourselves are filled with air, which exerts an equal outward pressure. If any change in pressure is suddenly experienced we are made uncomfortable or possibly seriously injured before the internal adjustment of pressure can be made. A pressure of 15


Outlet smaller than inlet to insure a steady flow
Vacuum
Air removed from cylinder by piston
Height water can be "pumped" at Sea Level — Theoretically 34 feet, Practically 28 feet or less
Water rising due to Air Pressure
Air pressure
30 inches of Mercury
Air pressure holding up Mercury
Illustrating Principle of Mercury Barometer
Water can be forced to any height limited only by the strength of materials employed and the force applied.
WATER LEVEL
SUCTION PUMP
FIG. 12
FORCE PUMP

pounds per square inch is ordinarily termed one atmosphere. In tunnel work, where extra pressure is required, it has been found that an ordinary man can only stand three extra atmospheres, or a total pressure of 60 pounds per square inch. On the other hand, an ordinary man can become accustomed to live at high altitudes where the pressure may be only about one-half of an atmosphere.

If the air is pumped out of a vertical pipe, one end of which is in water, the weight of the air outside will press the water up into the pipe until there is a height of water just balancing the outside pressure of the air. At sea level the height of water would be 34 feet. If mercury instead of water were used, it would rise only thirty inches, due to the fact that mercury is about 13.6 times heavier than water. This explains the principle of the "suction" pump (see Fig. 12). Due to leaks and friction in valves and pipes, it is practically impossible to "suck" or draw water 34 feet, and from 25 to 28 feet is generally taken as the limit. If the source of supply is at a greater depth than 25 feet the pump cylinder must be placed within 25 feet of the water level, and then the liquid can be lifted the rest of the way. While a pump will only draw about 25 feet, it will lift to any height (see force pump Fig. 12), limited only by the strength of the pump materials employed and the force applied.

As the pressure of the air decreases, water will vaporize or boil more quickly. Table III. gives the approximate elevations of some points in Canada, and shows approximately for normal weather conditions and for a temperature of 32 degrees F. the height of the mercury barometer, the theoretic height water can be pumped and the boiling point of water for each point.

(Continued in next issue.)

WHAT Are You DOING?

Yes, we know War is Hell, but what are you doing about it—sitting down and letting your business go to War?

Place.	Altitude in feet. Above sea level	Mercury Barometer in inches	Water Column in feet	Boiling Point in degrees F.
Montreal	110	29.9	33.9	211.8
Ottawa	210	29.8	33.8	211.6
Toronto	250	29.7	33.7	211.5
Winnipeg	760	29.15	33.0	210.5
Calgary	3400	26.35	29.8	205.4
Kicking Horse.	5330	24.5	27.7	201.8

TABLE III.

Address on Gas Water Heaters

This Address was Delivered to the Ontario Society of Sanitary and Heating Engineers at Their Fourth Annual Convention Held April 22, 23 and 24 Last. A Large Attendance Gathered to Hear it, and Quite a Few Interesting Questions Were Asked.

By E. S. Stack, inventor of the Stack Gas Water Heater.

WE concluded our article under the above heading with a passing reference to Fig. 7, which we show herewith.

As will be seen, this is rather an unusual installation, but it has several very interesting features. For instance, if a person required only about five or seven gallons of hot water, and for some reason or other left the gas on, the gas water heater would be under the control of the thermostat which is inserted in the upper portion of the boiler; the lower thermostat would control the heater at the left side of boiler, and could be operated by first lighting it by hand. This thermostat would close as soon as a large amount of water was heated. The pilot light would be burning, and in case the gas on this heater was left burning, the thermostat would turn off the gas.

Several very interesting slides were shown, illustrating a non-bypass tee. The object of using such a fitting was very apparent. To illustrate the point, examine Fig. 7. Suppose the hot water tap is turned on, the cold water rushes in and replaces warmer water at the bottom of the boiler. This cold water can circulate up through the heater and mix with the hot water flowing through the hot water pipe.

Fig. 8 shows two horizontal boilers, both fitted with non-bypass tees. It will be seen that the tee has an inserted baffle similar to an elbow turned down. This prevents the cold water from circulating through the heater, and allowing the hot water at the top of the boiler to pass up through the hot water pipe only when a tap is opened.

Fig. 8 also shows two method of connecting up horizontal range boilers with water front and gas water heaters.

Regular horizontal boilers are designed to be used in a horizontal position only. Good hot water service can be had from these boilers while using gas water heaters if properly installed. Horizontal boilers are designed and constructed to be used in connection with coal fires. In such cases the coal fire is applied from 10 to 15 hours a day, as it is intended that the contents of the boiler shall be kept hot continuously.

As it is not desirable to run a gas water heater for so long a period in order to supply the requirements of hot water, it will be seen in using a gas water heater in connection with a horizontal boiler, that some changes of piping forming the circulation between the boiler and the heating may be required.

Unless the entire contents of the boiler are kept hot for use the hot water cannot be so readily obtained from the horizontal boiler as from a vertical boiler.

This should be taken into account when a gas water-heater is to be installed with a horizontal boiler. In the horizontal boiler the hot and cold water come in contact with each other to a greater extent than is the case with a vertical boiler. This necessarily means that the hot water loses part of its heat by becoming mixed with the cold. Especially

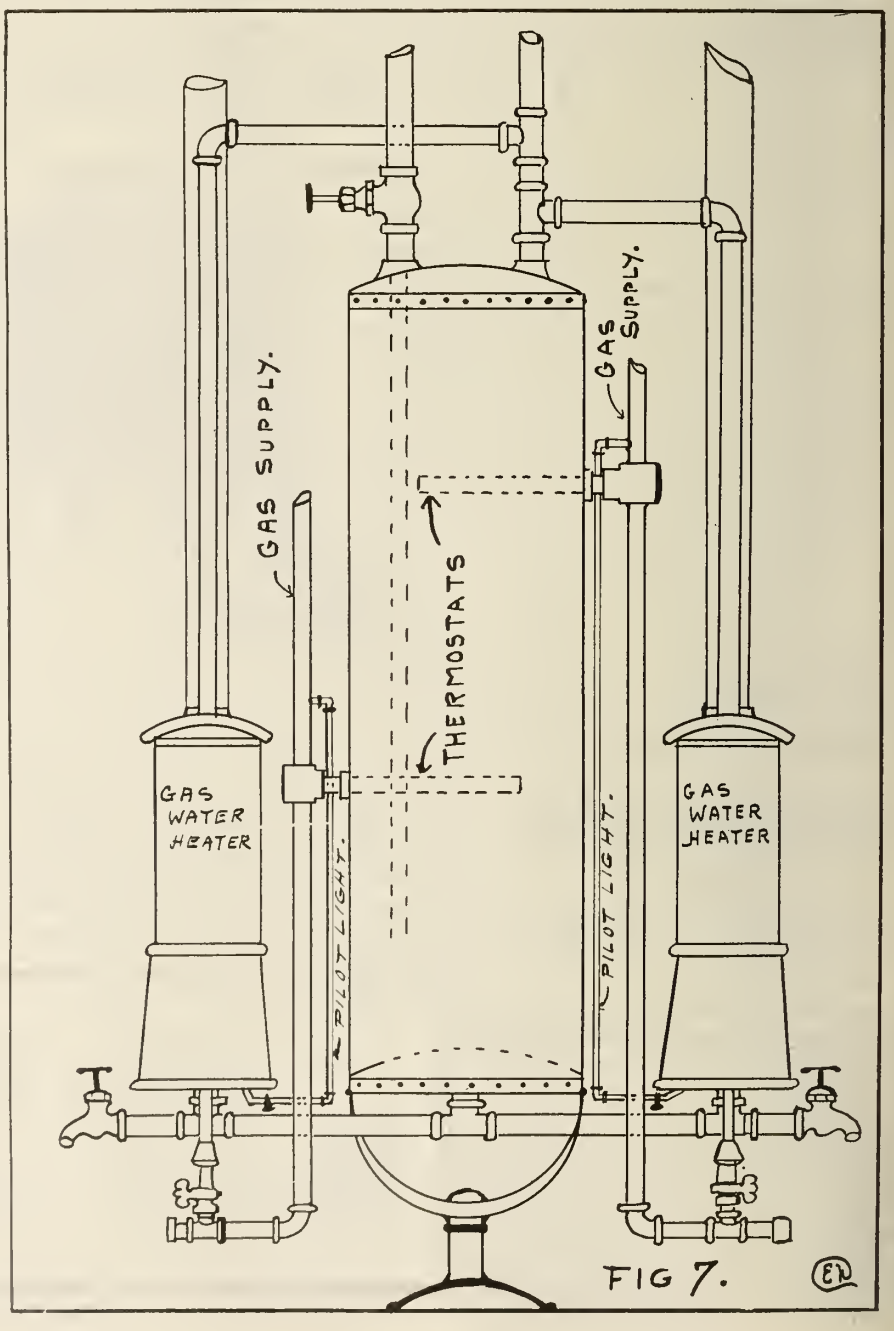


FIG 7.

*Figs. 8, 9, 10, 11 are reproduced by the courtesy of the James Morrison Brass Manufacturing Co., Ltd., Toronto.

quantity of hot water is required, say four to five gallons.

As the gas water heater is supposed to furnish these small amounts of water quickly, it will be plainly seen that a horizontal boiler is not as desirable and cannot possibly give as good service as the vertical boiler. However, good water service can he had through a gas water heater, with a horizontal boiler if proper care is exercised when connecting it up.

Fig. 9 shows quite a novel departure from the regular use of gas water heater installations.

Here is shown an auxiliary heating system. connected up to the radiator mains of the house. Three heaters are shown in battery formation. All are controlled hy a thermostat. Then another gas water heater is installed on the return line from radiators. This heater is shown installed in the chimney pipe, and is so placed as to use up any waste heat units which may he passing up the chimney, thus acting in the capacity of an economizer. It will be seen too that there are thermometers fitted into both feed and return mains. These are very useful in showing the heat loss through radiation, the two shown on the return also show the amount of heat units saved by placing one heater in the chimney, hecause, on the water returning, the first thermometer will register the temperature, and the second which is situated between the thermostat and the economizer registers the amount of heat saved.

Another very interesting slide was shown—that of the stack distant control system. Fig. 10.

This system consists of two castings, containing diaphragms, one located on the gas valve and the other on the distant control

These castings are connected hy three-sixteenth copper tubing. Water is contained in the three-sixteenth tuhing between the diaphragms. The gas valve is operated by pressure being exerted on the diaphragms. This pressure is created by the movement of the distant control lever which presses against the diaphragm. forcing the water with pressure against the diaphragm on the gas valve.

When this pressure is exerted on the diaphragm, the water naturally in turn presses against the diaphragm on the gas valve and throws the gas valve open. When the pressure is released on the distant control valve, naturally the pressure is greater on the gas valve diaphragm due to the force exerted by the spring which necessarily returns the water to its normal position in the distant control valve chamber—the three-sixteenth tubing, and also closes the gas valve.

The gas valve consists of a main valve which controls the flow of gas to the heater. The valve is held close hy a strong spring. From the gas side of this valve an opening is tapped, on to which is attached the hand control, or gas valve. which enables the user to turn the gas on and off from the location of the heater. This is a very simple positive method of operating the gas valve. In case of misuse or damage to the parts which control the water (which might cause a leak), the distant control is merely inoperative. No damage can be done hy the water hecause there is less than one-half pint of water contained in the whole outfit.

Figure 1.

A. Wall, on to which the control may he fastened.

B. Flange bracket which holds the control.

C. Plug for filling the control.

D. Tube connection.

E. Top flange of diaphragm holder.

F. Bottom flange of diaphragm holder.

H. Diaphragm follower.

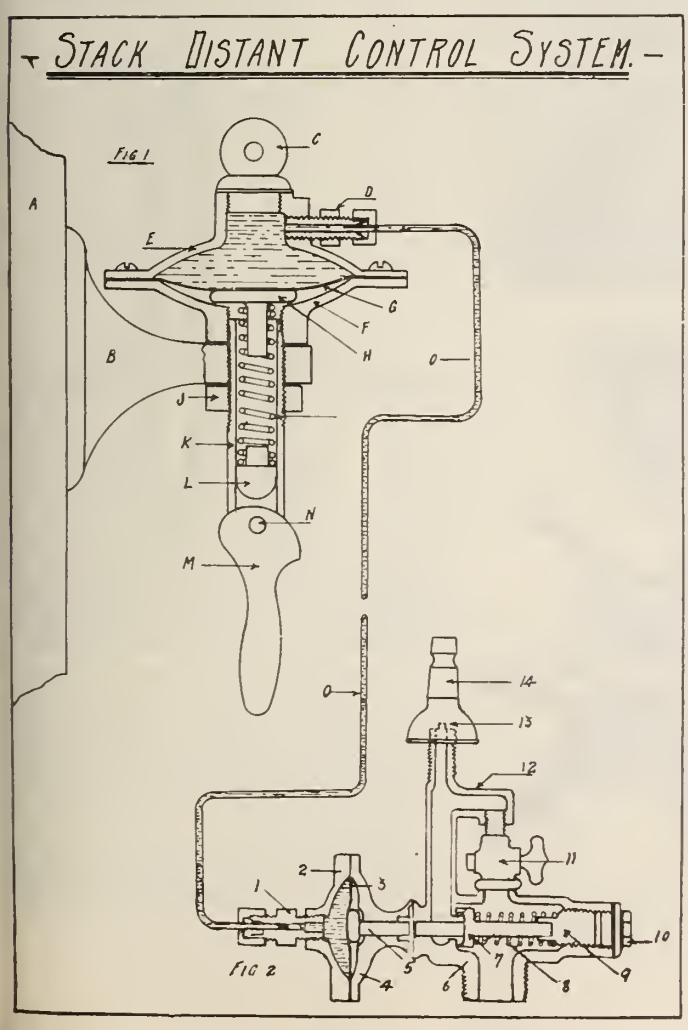
I. Spring. bearing against diaphragm follower and spring guide of plunger L.

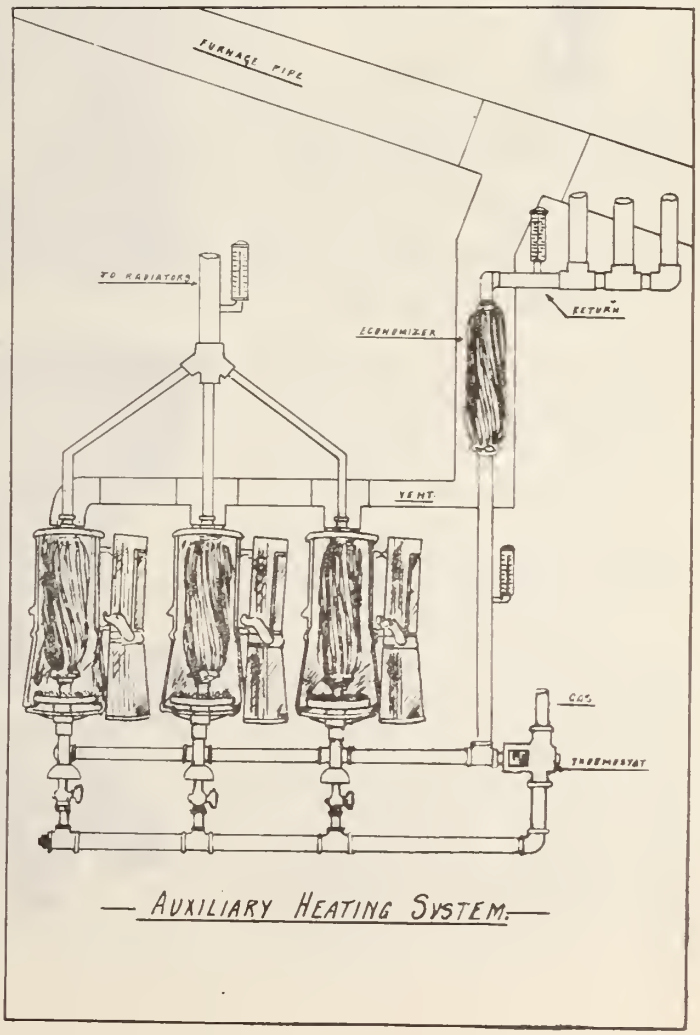
J. Check nut to fasten control to flange bracket.

K. Casting containing diaphragm actuating spring.

L. Plunger and spring hearing.

(Continued on page 26.)

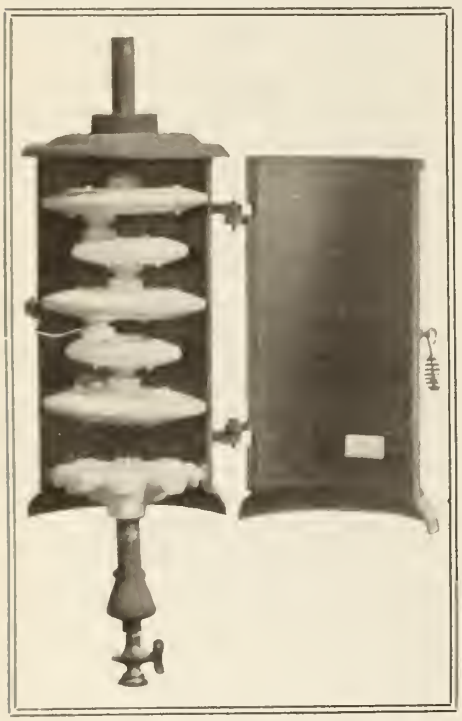




New Sanitary and Heating Goods

NEW GAS WATER HEATER.

Very few lines are attracting as much attention at this season of the year as gas water heaters, and to meet all kinds of demands new gas water heaters made in Canada, are being placed upon the market.



New Imperial Gas Water Heater.

The latest to come to our notice is the "New Imperial." Goodwin & Co., of Sarnia, are the manufacturers, from whom all particulars may be had. View of the heater is shown herewith.

"PURO-FY" DRINKING FOUNTAIN.

If any ordinary thinking man had ventured to assert ten years ago that in ten years' time the public drinking cup would be looked upon with disfavor, and condemned by the medical fraternity, and that most of our schools, factories and public buildings would have drinking fountains installed, that man would have been looked upon as having a few more wheels in his "think tank." Yet that is just what is happening, and manufacturers have responded in no half-hearted way, by putting some splendid drinking fountains on the market, one of the many being that of "The Puro-fy" Sanitary Drinking Fountain Co., 147 University avenue, Toronto. The Puro-fy sanitary drinking fountain has some very novel claims. No waste of water, can be used both as bulb or fountain. Further particulars as to prices, etc., may be had upon application to the above address.

WATER SUPPLY SYSTEMS FOR TOWN AND COUNTRY HOMES.

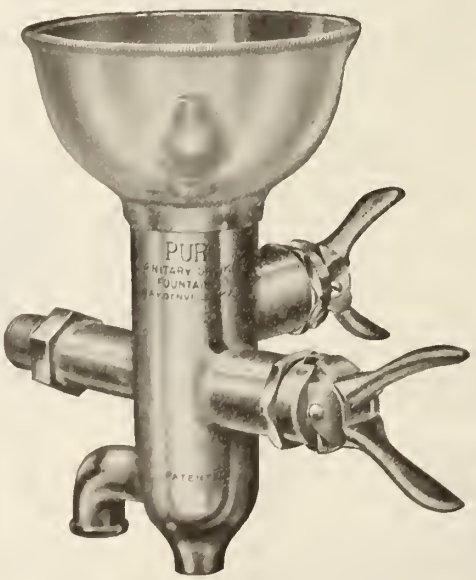
Above is the title of a very handy booklet which is being distributed to the trade by the John Stevens Company, Ltd., 661 Henry avenue, Winnipeg. It is highly illustrated and contains some very useful information, all of which cannot fail to interest every member of the craft. It may be procured upon dropping a request by post card to above address.

B.T. BRACKET HOUSE PUMP.

Beatty Bros., Limited, of Fergus, Ont., and Winnipeg, Man., are introducing to the hardware trade the B.T. bracket and house pump. The makers state it is an inexpensive and very convenient house pump for use in kitchens and summer cottages. It has a strong malleable iron bracket with which to fasten it to the wall above a rolled rim sink so a cumbersome wood frame is not needed. It can be used as a lift pump or as a force pump for foreing water to the attic storage tank.

The bracket, handle and spout of the pump admit of such a variety of adjustments that it is perfectly adapted to any installation. The bracket is reversible. It fits the pump just as well when turned upside down as when in the position desired, firmly secured by a half turn

(Continued on page 30.)



New Puro Drinking Fountain.

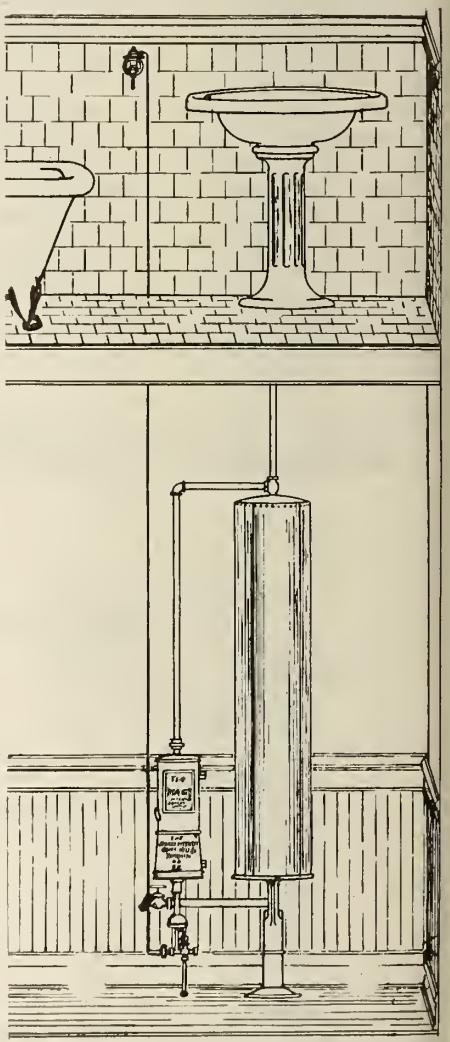
ADDRESS ON GAS WATER HEATERS.

(Continued from page 25.)

M. Eccentric handle.
N. Pivot for eccentric.
O. 3/16 tubing (copper).

Figure 2.

1. Copper tubing connection.
2. Water end of diaphragm casting.
3. Diaphragm.
4. Gas end of diaphragm casting.
5. Diaphragm follower.
6. Casting for gas valve.
7. Gas valve.



8. Spring for gas valve.
9. Spring adjuster.
10. Cap for gas valve casting.
11. Hand control gas cock.
12. Extention piece for gas valve.
13. Tip, or spud, for gas orifice.
14. Burner stem.

Fig. 11 gives the reader an idea of what such a distant control installation looks like.

GOSSIP OF THE TRADE

INSTAL STEAM HEATING SYSTEM.

Hamilton & Stott, sanitary engineers, St. Thomas, have received the contract for installing a low pressure steam heating system in the Presbyterian church in Ingersoll.

AN OLD FIRM UNDER A NEW NAME IN FORT WILLIAM.

Owing to a change in the personnel of the firm of Higginbottom & Company, it has been deemed expedient to change the name. From now on the new name of the firm will be the Dominion Plumbing Company, Limited, with offices at 119 Leith street, Fort William, and 279 Arthur street, Port Arthur. On account of Mr. Higginbottom enlisting for overseas services the management will be in the hands of Mr. J. Marshall.

TO CLOSE WEDNESDAY AFTERNOONS.

A meeting of Stratford sanitary and heating engineers, tinsmiths and metal workers was held recently to consider the question of a half holiday weekly. It was decided that during the remainder of June, all July and August the tinsmithing and plumbing departments will be closed each Wednesday afternoon, to allow the workmen a half holiday.

TO ONTARIO MEMBERS.

St. John, New Brunswick, on June 22 to 24.

The 20th annual convention of the Canadian Society will take place in St. John, New Brunswick, on June 22nd, 23rd and 24th, 1915. Members of the Ontario Society intending to go to St. John will kindly communicate with Secretary Frankland for the necessary credentials, and also forward their names at once, so that the officers of the Canadian Society can be notified of the number going from Ontario. Our members who are going to St. John will also attend our general meeting on June 18th, when the necessary instructions will be handed to the delegates, who will leave Toronto in a party for St. John, New Brunswick.

Messrs. Gibbons, Eggett, Noble and Russell, of London, are the appointed delegates that will represent London at St. John.

TO MEET IN WINNIPEG.

The National Council of the Canadian Credit Men's Association, Limited, Dominion-wide organization, formed in the interests of wholesalers and manufacturers granting credit, will hold its annual meeting in Winnipeg on the 22nd and 23rd of June. Delegates will be present representing the different provinces of Canada.

W. L. HELLIWELL,

General manager, Gurney North-West Foundry Co., Winnipeg; president, Canadian Credit Men's Association, Winnipeg. A meeting of the National Council of the Association representing all branches will be held in Winnipeg during the week commencing June 21.

The association, which was formed in 1910, has grown rapidly, and organized, as it is, with a view to the promotion of high ideals in business and a higher plane of public morality with respect to credits and credit granting, it is easy to understand why it has been possible for this body, starting from a mere handful of credit men, to form a Dominion-wide organization, with branches in all the principal cities of the country.

NOVEL MEMBERSHIP CONTEST.

What is, at least so far as St. Thomas is concerned, an entirely novel proposition for increasing the membership of an organization is to be carried out in connection with the local Y.M.C.A. as the result of the generosity of three local business men.

Messrs. Hamilton & Stott, sanitary and heating engineers, have offered a prize of $50 to the young lady who shall secure the most members for the Y.M.C.A. during a month's membership campaign, which will be conducted from June 1 till 6 p.m. on June 30. All men and boys over 12 years of age are eligible for membership.

To the above generous offer James Bristow, manager of the Western Dairy Company, Limited, city, has added a prize of $25 for the lady securing the second highest number of members.

KEEP SAWING.

A motto that the members would do well to adopt was received from E. H. Russell, London, and is as follows:—

"A motto," the old man said, with a smile,
To the boy who came one day,
"Some good advise in the nutshell style,
To cheer you along the way.

"Well, here is a plan—and I ought to know,
For I've found it powerful good;
The grin will come, and the grouch will go,
If you keep on sawing wood."

HAMILTON SANITARY ENGINEER PASSED ON.

The death occurred recently of George H. Harper, at his late residence, 251 Caroline street south, Hamilton. The deceased was born in this city and had resided here all his life, having conducted a plumbing and gas fitting business here for many years. His widow and mother survive. The funeral was conducted under the auspices of Minerva Lodge, I. O. O. F., of which the deceased was a member.

Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WHAT QUANTITY OF WATER IS NECESSARY TO FLUSH A W.C.?

Editor The Sanitary Engineer.—I am about to install a pneumatic water system in a country place, and would like to have your advice as to the quantity of water which is necessary to flush a w.c. When the water has to be pumped right there in the house, it is no joke to be wasting water by using too much to a flush.

Sanitas.

We are of the opinion that three gallons is ample, particularly if the septic tank is not too far from the house, and in that connection, we may state that it is even advisable to ascertain how little water can be used at one flush, this could be found out by trying how much the bowl really needs so as to flush it clean.

Many a septic tank has been overloaded with water.—Editor.

HOW TO CONNECT RANGE BOILER WITH EXPANSION TANK.

Editor The Sanitary Engineer.—In the last issue of your journal you stated that no range boiler should be connected on to a city water main. If such is true, how would you advise the expansion tank in the attic to be connected and how would a circulating pipe be fitted on to such a job so that there would be little or no cold water drawn off at any tap as is the case at present? Further do you advise a circulating system, and if so, why?

Maritime P.

Fig. 1 shows a popular method of connecting a supply and expansion tank to range boiler. We strongly advise the installation of a circulation pipe to all hot water supply pipes, because by the use of a circulation pipe the waste of water is avoided. In apartment houses, or hotels, and even in houses where the range boiler is situated a long distance from the bathroom, a great deal of water is wasted, and most of such places are on the meter system thus every gallon of water has to be paid for.

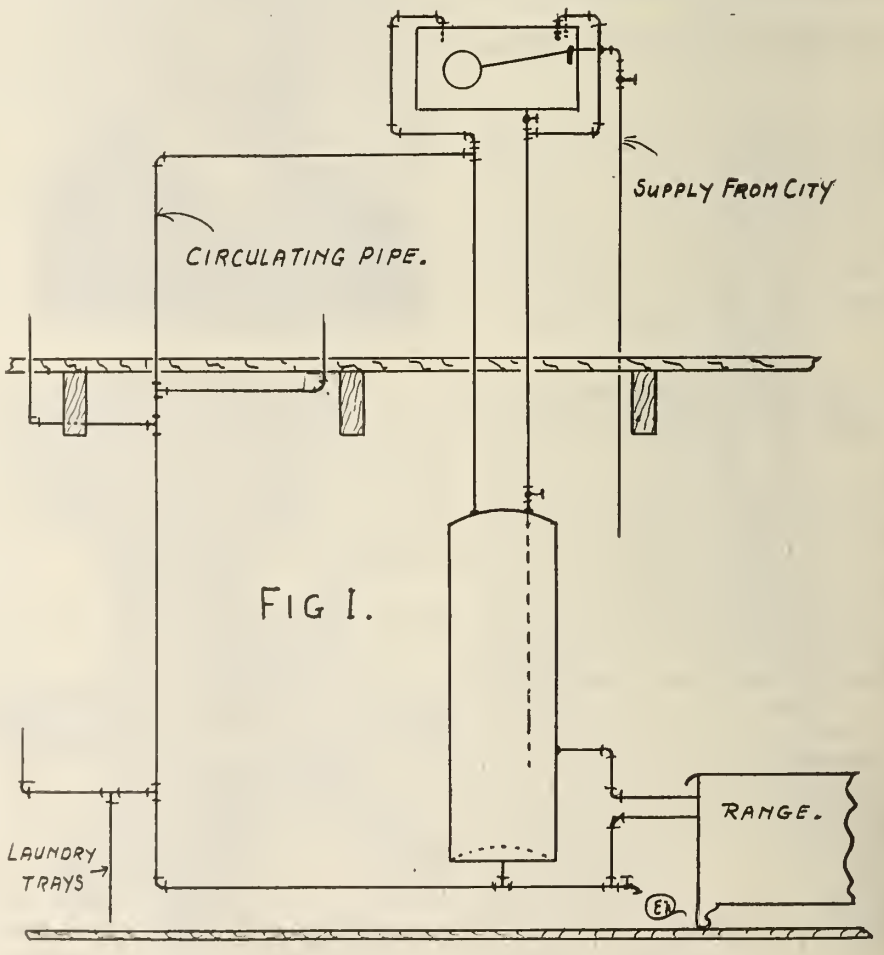
Fig. 2 shows another method which has some little advantage over Fig. 1, in that less pipe is necessary.—Editor.

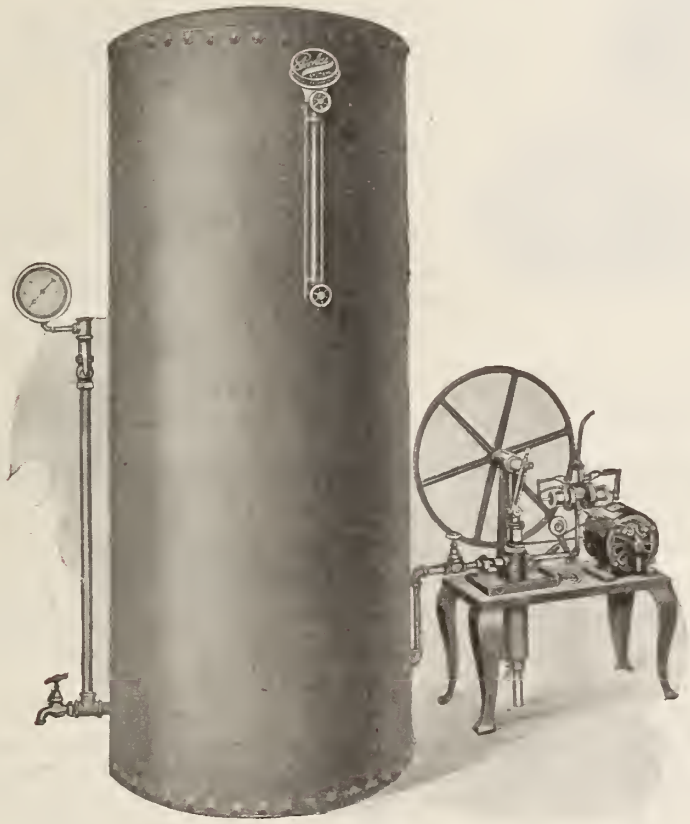
See Fig. 2 on page 30.

HOW TO FACE THE SITUATION.

"Forget it; dig in. If I were out on the road selling goods at the present moment and anyone told me that there was a depression I wouldn't admit it. As a matter of fact, I would prefer to consider hard times as a test of my ability to produce results. I would stiffen my backbone, grit my teeth, and just make up my mind that I simply would get business, for I think it is undoubtedly true that times of depression constitute golden opportunities for first-class salesmen, since those whose wishbones are better developed than their backbone immediately become dis-

(Continued on page 30.)





There may be an apparent saving of a couple of dollars in buying a "piecemeal" outfit, but subsequent troubles cost a lot of money—Peerless Water Systems don't give trouble.

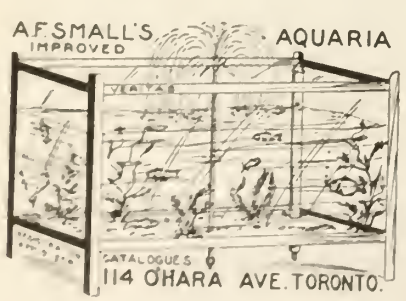
"PURO - FY"
(MADE IN CANADA)

THE American Museum of Safety conferred a Gold Medal Award upon the Puro Sanitary Drinking Fountain at the First International Exposition of Safety and Sanitation.
The Puro Sanitary Drinking Fountain won because it deserved to win—Puro had merits that made it stand head and shoulders above any other drinking apparatus.

Safe Simple
Sanitary Economical
Quickly Attached

These are the qualities that forced the leading safety and sanitary engineers to pick Puro in preference to all others.
No device can be as efficient that does not contain all these qualifications; and Puro was not tied for first place; Puro was first.
Don't be satisfied with half-way goodness, or makeshift drinking arrangements for your employes.
If the men in your factory must drink, give them a clean drink.
Puro is clean—it does not rust or corrode.
Puro is economical. It allows just the proper amount of cool, clean, fresh water to come through the bubbler. No spurting, no overflowing, no loss. Puro regulates itself. You can attach it in five minutes.
Tell us how many men in your factory and your water pressure in pounds—
We'll tell you just what it will cost to "PURO-FY" YOUR WATER SUPPLY.

PURO SANITARY DRINKING FOUNTAIN CO.
TRADE MARK
147 University Ave. TORONTO, ONT.



A want ad. in this paper will bring replies from all parts of Canada.

HOW TO FACE THE SITUATION.

(Continued from page 28.)

couraged, but the real salesman proceeds to make things happen. In hard times the order-taker falls to the rear, but the creative salesman forges ahead, because he knows what he wants and he goes out after it."

NEW GOODS.

(Continued from page 26.)

of a bolt in the bracket. The spout, too, turns independently of either bracket or handle and when the former are fastened can be placed in any position desired.

It was originally designed to take the place of the German clock or wing pump, and the makers claim that it does the work better for it has a larger capacity lifts easier, can be more readily repaired and lasts longer.

It has a nickel plated brass body, 3-inch cylinder, and parts nicely finished.

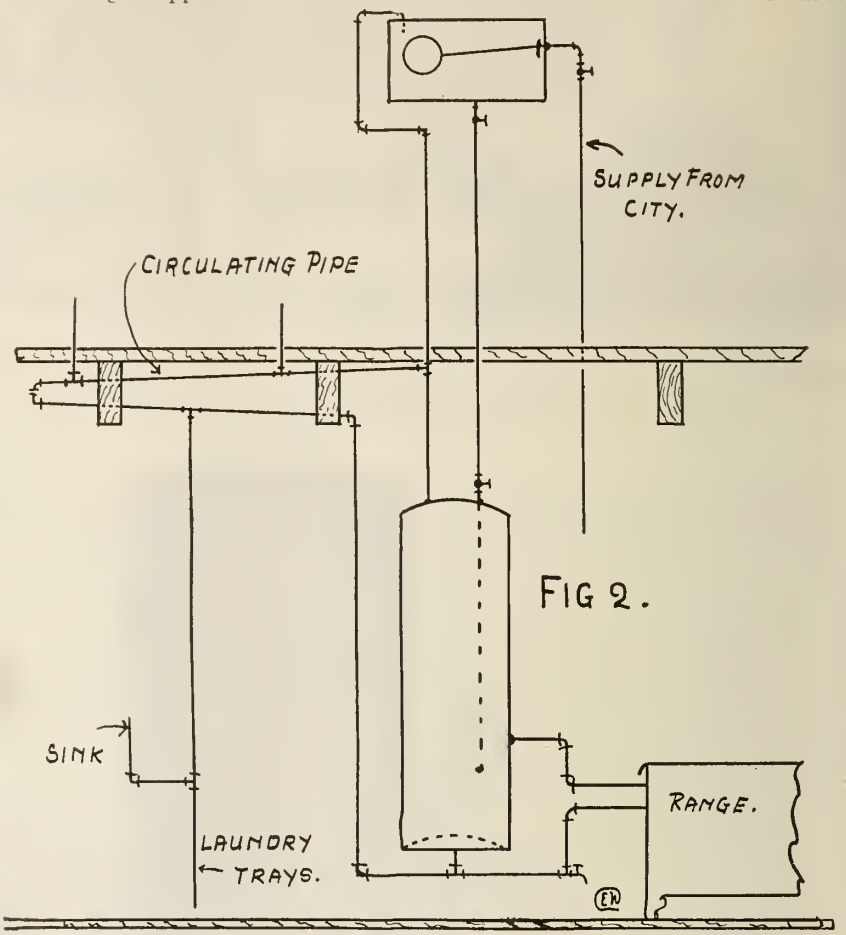
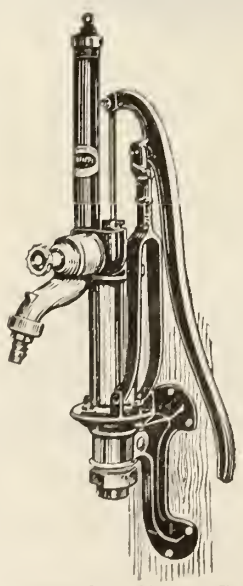


FIG 2.



B. T. Bracket House Pump.

Advertising Clubs at Chicago.

Chicago will be the scene of the eleventh annual convention of the Associated Advertising Clubs of the World, which meets June 20 to 24. This great gathering of the dynamos of the business world to discuss common problems and to advance the banner of truth in advertising promises to hold a unique place in the events of the year.

President Wilson (war conditions permitting) will head the list of speakers. Hon. William Jennings Bryan, John H. Fahey, president of the Chamber of Commerce of the United States; Henry Watterson, George Horace Lorimer, editor of the Saturday Evening Post; and Arthur Brisbane are among others of national prominence who are to address the sessions. On the Sunday preceding the formal opening of the convention fifty business men of country-wide reputation will deliver lay sermons in Chicago churches.

Quick Hot Water at a Big Saving
——of Gas——

ONE MINUTE AFTER THE

Stack Gas Water Heater

IS LIT IT GIVES HOT WATER AT THE TAP

This is actually the most durable and long-lived Copper Coil Gas Water Heater made—it is the easiest and quickest to instal.

Cost but little more than the ordinary heater, but the extra cost is quickly covered by the savings effected.

EASILY SOLD ***BIG PROFIT***

James Morrison Brass Mfg. Co.

Limited

93-97 Adelaide Street West, Toronto

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

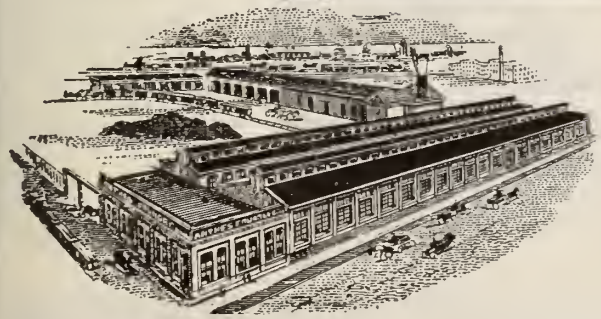
Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

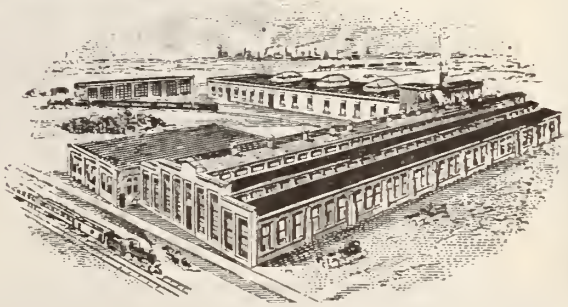
New York, N. Y.; London, Eng.; St. Louis, Mo.

TORONTO **ANTHES FOUNDRY LIMITED** **WINNIPEG**



MANUFACTURERS OF

CAST IRON SOIL PIPE AND FITTINGS



ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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Beaton & Cadwell 4

Canadian Tube & Iron Co. 33
Canadian Wolverine Co., Ltd. .....
Cluff Manufacturing Co. 4
Consumers' Gas Co., The 4

Dart Union Co. ..... Inside Back Cover

Eddy Engineering Co. 36

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Steel Radiation, Ltd. 10

United Electrical Co., The 1

Warden King, Ltd. 3
Williams, J. H., & Co. 33

MOTT COMPANY, LIMITED

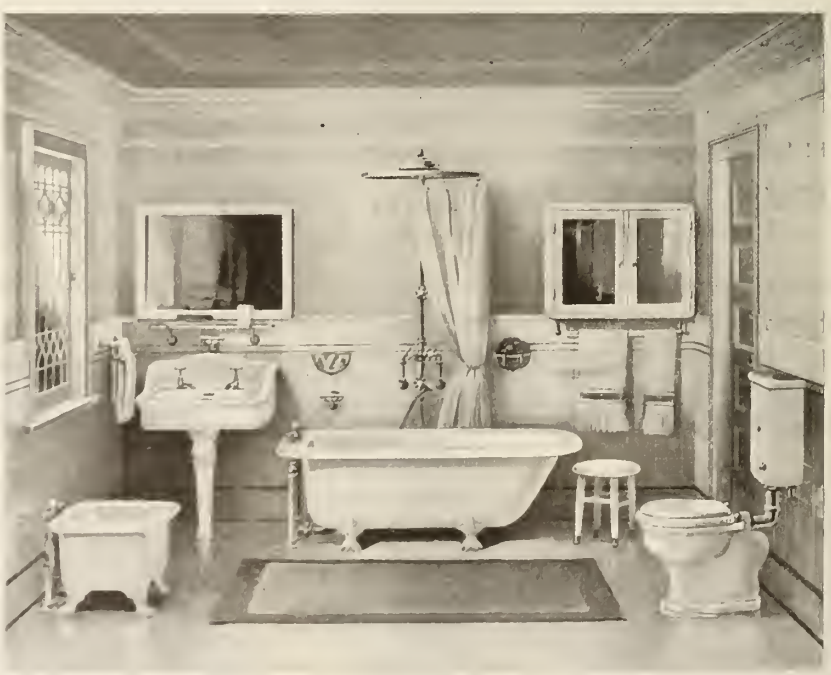
134-136 BLEURY STREET - - MONTREAL, QUE.

Fine Grade Plumbing Appliances in solid Imperial Porcelain and Enameled Iron.

Baths, Lavatories, Kitchen and Pantry Sinks, etc.

Hospital Sanitary Fixtures and Equipment.

Ornamental Lamp Posts, Display and Sanitary Drinking Fountains.



If building, send for our complete catalogue showing latest up-to-date Plumbing installations or call at our showrooms and inspect the most complete exhibition of sanitary Plumbing appliances ever made in Canada.

Mott's "Madison" Bathroom Fine Grade Fixtures at Moderate Prices.

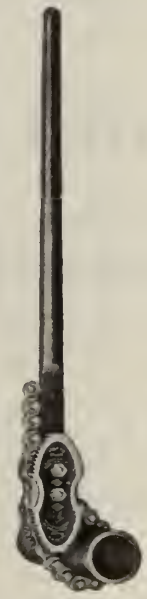
WROUGHT PIPE

BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal



Williams Chain Pipe Tools

are guaranteed to provide for unusual service and you will never go wrong if equipped with them for any work in their line. No substitute ever has or will serve you as thoroughly and as often.

Improved "Vulcan"
Double Ended Reversible Jaws. "Two Tools in One at the Price of One" for Pipe Work.

"Agrippa"
with Single Jaw and Flat Chain, an excellent tool for close-quarters in Pipe and Fittings work.

Send for Pipe Tools Pamphlet

J. H. WILLIAMS & CO.
Superior Drop-Forgings
77 Richards St., Brooklyn, N.Y.

Branch Factory
Buffalo. N.Y.

To Become More Efficient Requires
MORE STUDY
FURNACE HEATING is the title of a splendid book by
W. G. SNOW. It deals with

Furnaces
House Heating
Combination Systems
Air and Humidity
Estimates and Contracts
Furnace Fittings
Heating and Ventilation of Schools
Heating of Public Buildings, Churches and Stores
Fan Furnace Combination System
Temperature Control
Fuel, Miscellaneous Data
Various Sources, on Furnace Heating

Price $1.75 postpaid

TECHNICAL BOOK DEPT.

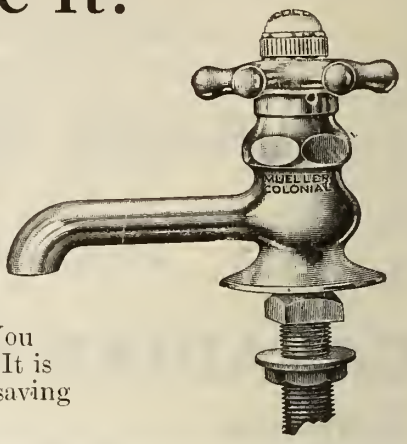
MACLEAN PUBLISHING COMPANY, LIMITED
143-153 University Ave., TORONTO

Look It Over, Test It Out, Ask Those Who Use It!

Compare it with other goods—make your investigation as thorough, and as rigid as you can. We know that your ultimate decision will be for

MUELLER
Colonial Self-Closing Work

MUELLER Colonial Self-Closing Basin Cock.



I 12902 (Patented)

A strictly high-grade article, designed to give the utmost service. You will make no mistake in specifying Mueller Self-Closing work. It is giving absolute satisfaction in hundreds of big buildings and saving money for the owners by eliminating water waste.

All Mueller Goods are tested under 200 pounds hydraulic pressure and Unconditionally Guaranteed.

S.E.

H. Mueller Mfg. Co., Ltd. Sarnia, Ont.

Send me literature and prices on Self-Closing Work.

Signed ....

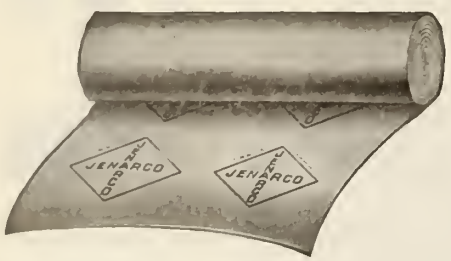
City .....Prov. .....

Made in Sarnia, Canada

H. Mueller Mfg. Co., Limited

SARNIA, ONT., CANADA

Makers of High-Grade Water, Plumbing and Gas Brass Goods.



Leaky Joints are Made Permanently Tight with

JENARCO

JENKINS BROS.' NEW SHEET PACKING

JENARCO

This splendid product is a high-grade, semi-vulcanized sheet rubber packing that possesses extreme toughness and flexibility. It is not influenced by climatic conditions and does not deteriorate in storage.

Engineers and Steamfitters strongly recommend its use. They have learned by experience that JENARCO will make an absolutely tight and durable joint under service conditions where ordinary packings fail.

Jenarco is equally dependable for high-pressure steam, hot or cold water and other liquids which do not attack rubber.

Order "JENARCO" from your dealer to-day. Catalogue sent free upon request.

JENKINS BROS., Limited

103 St. Remi St. - Montreal

Classified Buyers Guide

Occasionally advertisements are inserted in the paper after this page has gone to press. The insertion of the Advertiser's name on this page is not part of the advertising order, but is inserted solely for the convenience of the reader of the paper.

Acetylene Gas Generators.
P. Campbell & Co., St. John, N.B.

Air Line Systems.
C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
C. A. Dunham Co., Ltd., Toronto.
Gurney Foundry Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
Jenkins Bros., Ltd., Montreal.
Kerr Engine Co., Ltd., Walkerville.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
Wallacehurg Brass Mfg. Co., Wallacehurg, Ont.

Aquarias.
A. F. Small, Toronto.

Ashestos Goods.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Boilers, Steam or Hot Water.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal

Boiler Feed Regulators.
C. A. Dunham Co., Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, Etc
Canadian Wolverine Co., Ltd., Chatham.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., London.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Cellar Drainers.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Penberthy Injector Co., Ltd., Windsor, Ont.

Closets.
Amherst Foundry Co., Amherst, N.S.
B. O. T. Manufacturing Co., Toronto.
Cluff Mfg. Co., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Consulting Engineers.
H. L. Seymour.

Correspondence Schools.
Anglo-American Sanitary School.

Country Residence Equipments.
Empire Brass Mfg. Co., London.
General Machinery Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Limited, Toronto.
Jno. Stevens & Co., Ltd., Winnipeg.

Damper Regulators.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
Empire Brass Mfg. Co., London.
Fittings, Limited, Oshawa.
International Malleable Iron Co., Ltd., Guelph, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.
Penberthy Injector Co., Ltd., Windsor, Ont.

Ejectors for Sewage.
National Equipment Co., Ltd., Toronto.

Enamelware.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Electric Pumping Machinery.
Ashdown Hardware Co., Ltd., Winnipeg.
Empire Brass Mfg. Co., London.
General Machinery Co., Ltd., Toronto.
National Equipment Co., Ltd., Toronto.
Jno. Stevens & Co., Ltd., Winnipeg.

Fittings.
Empire Brass Mfg. Co., London.
International Malleable Iron Co., Guelph.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., London.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
Canadian Wolverine Co., Ltd., Chatham.
Gurney Foundry Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Garbage Burners.
Gurney Foundry Co., Ltd., Toronto.

Gasoline Engines.
National Equipment Co., Ltd., Toronto.

Gas Water Heaters.
Gurney Foundry Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Gas Generators.
P. Campbell & Co., St. John, N.B.

Generators.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Gurney Foundry Co., Ltd., Toronto.
Harris Construction Co., Ltd., Montreal.
E. S. Manny Co., Montreal.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
Empire Brass Mfg. Co., London.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Lighting Plants.
P. Campbell & Co., St. John, N.B.

Mixing Valves.
Geo. Carpenter, Montreal.
Standard Sanitary Mfg. Co., Toronto.

Nipples.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
Warden King, Ltd., Montreal.

Oil Storage Systems.
General Machinery Co., Toronto.
National Equipment Co., Ltd., Toronto.

Packing.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

Pipe Joint Compounds.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

Porcelain Ware.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Cluff Bros., Church St., Toronto.
C. A. Dunham Co., Ltd., Toronto.
General Machinery Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
John Stevens & Co., Ltd., Winnipeg.

Radiators.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn.

Radiator Traps (Steam.)
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.

Solder.
Hoyt Metal Co., Toronto.

Steam Specialties.
Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Eady Engineering Co., Alpena, Mich.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.
The E. S. Manny Co., Montreal.
Penberthy Injector Co., Ltd., Windsor, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
C. A. Dunham Co., Ltd., Toronto
Harris Construction Co., Ltd., Montreal.
E. S. Manny Co., Montreal.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Testing Plugs.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.

Tools.
Armstrong Mfg. Co., Bridgeport, Conn.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tap & Die Co., Ltd.
Hall & Sons, Ltd., Brantford.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.

Unions.
Dart Union Co., Ltd., Toronto.

Vapor Heating Systems.
C. A. Dunham Co., Ltd., Toronto.

Vitro Tanks.
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Ashdown Hardware Co., Ltd., Winnipeg.
Empire Brass Mfg. Co., London.
General Machinery Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
John Stevens & Co., Ltd., Winnipeg.

G. M. C. WATER SYSTEMS

A Word to the Wise:—

A single riveted tank is 50% as strong as the plate of which it is made.

A double riveted tank is 70% as strong as the plate of which it is made.

Ask any mechanical engineer to verify these statements.

Our **Copper Brazed Tanks** are stronger at the joints than the plate of which they are made. In other words lighter plate may be used to produce a tank of the same ultimate strength as a riveted tank.

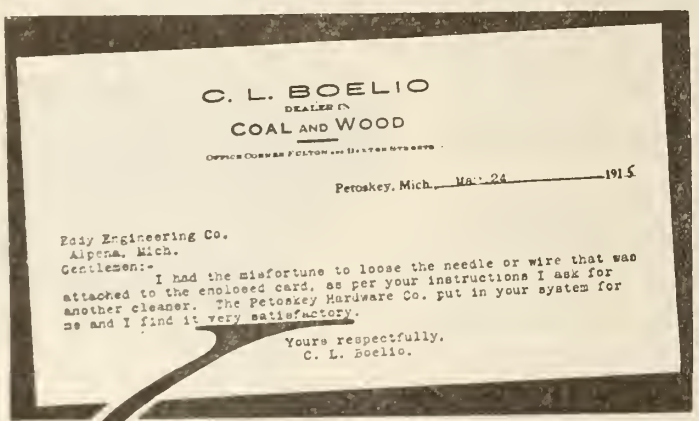
As a chain is no stronger than its weakest link, so a tank is no stronger than its weakest part. Weight and thickness of plate do not insure strength in a tank; **it is in the efficiency of the joint.**

Every rivet, every joint, in a riveted tank, is a possible source of leakage. There are no such danger points in our **Copper Brazed Tanks.**

A perfect tank is the best guarantee of a successful water system.

Ask for our latest prices.

The General Machinery Co., Limited 22-26 Mulock Ave., Toronto



C. L. BOELIO
DEALER IN
COAL AND WOOD
OFFICE CORNER FULTON AND HEATON STREETS

Petoskey, Mich. Mar. 24 1915

Eddy Engineering Co.
Alpena, Mich.
Gentlemen:-
I had the misfortune to loose the needle or wire that was attached to the enclosed card, as per your instructions I ask for another cleaner. The Petoskey Hardware Co. put in your system for me and I find it very satisfactory.

Yours respectfully,
C. L. Boelio.

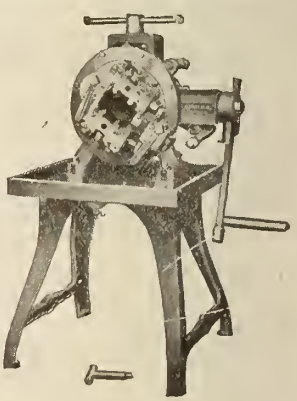
NOTE WHAT THE USER SAYS!

"VERY SATISFACTORY"

THE Eddy SYSTEM
AUTOMATIC VACUUM STEAM HEATING
EDDY ENGINEERING CO.
ALPENA, MICH.

Is not a proposition like this worth investigating?

WRITE!



No. 00

PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.
317 Knowlton Street
BRIDGEPORT, CONN.
WRITE FOR CATALOGUE

DART UNIONS

BRONZE TO BRONZE—no deterioration

Dart Unions defy time. They make a practically everlasting pipe connection because the bronze faces will not rust or corrode, and the heavy iron parts will not stretch or pull apart.

The Ball-shaped seat saves you time and trouble as it allows the connection to be easily and quickly made whether pipes are in or out of line.

By using the Dart you'll make many friends and get more repeat contracts. Your jobber sells them.

Manufactured by

DART UNION CO., LIMITED

Toronto, Canada

Made in CANADA

KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

This plant is at your service.
Help us keep it busy.

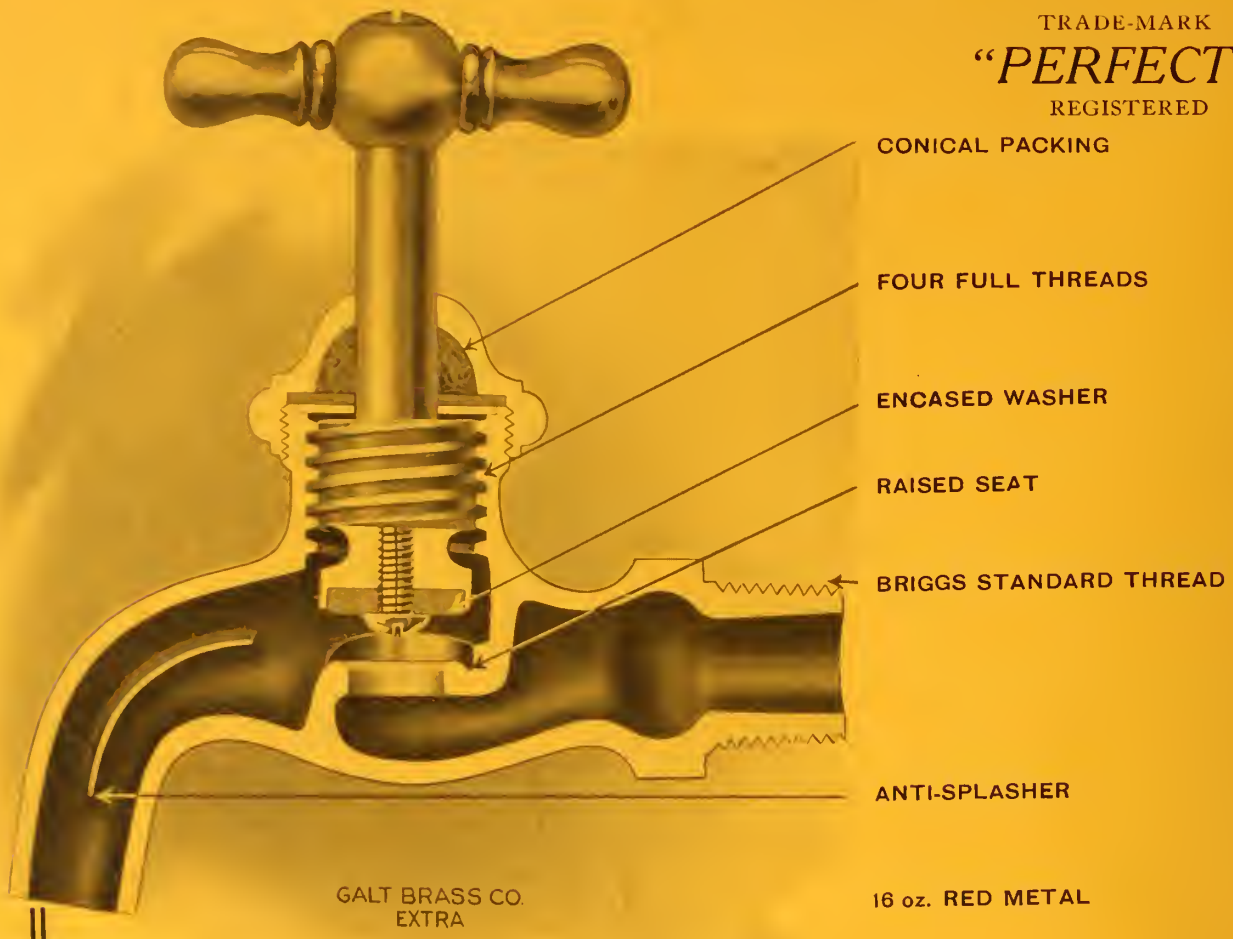
REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

Quickest possible deliveries. Consistent Prices. Best quality of goods Write for Catalog No. 5.

The Kerr Engine Company, Limited Walkerville, Ontario

Valves and Hydrants Exclusively

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX | Publication Office: TORONTO, JULY 1, 1915 | No. 13

"LEIGHTON" AND "LEICESTER" LAVATORIES

The slab is a plain oval design, without any ornamentation. Supported either on Enameled Pedestal, Enameled Pedestal Leg or Enameled Bracket, it retains the simple gracefulness of outline and proportion which has been the predominating influence in its selection for so many of Canada's highest class Homes.

TWO SIZES—19x27 in. and 22x33 in.

F110 and F110½ "LEIGHTON" on Enameled Pedestal.
F111¾ "LEICESTER" on Enameled Pedestal Leg.
F111 "LEICESTER" on Enameled Brackets.

The Standard Ideal Company Limited

General Offices and Factories: Port Hope, Canada

TORONTO	MONTREAL	WINNIPEG	VANCOUVER
119 King St. East	42 Beaver Hall Hill	80 Lombard St.	410 Carter Cotton Bldg.

Beaver Brand
Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co.,
71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes,
120 Lombard St., Winnipeg

BRITISH COLUMBIA:
A. O. Campbell,
864 Cambie St., Vancouver

FROM

HALIFAX TO VANCOUVER

The Daisy Boiler

Is The Most Popular

1915 MODEL

MADE IN CANADA

Over 55,000 Daisy Boilers are in use at the present time. Every one is giving satisfactory service.

Easy to Install and Easy to Operate

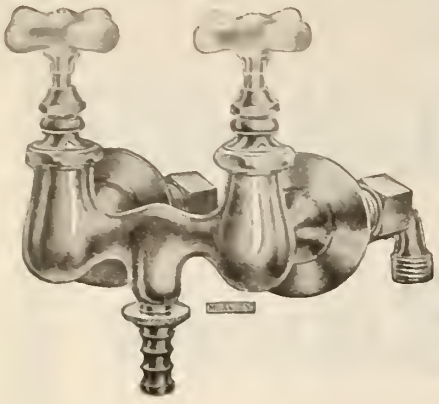
They are economical in use and will be found to give the required heat with a minimum consumption of coal.

WARDEN KING, LIMITED

MONTREAL

BRANCH :
200 Adelaide St. West, Toronto

CITY SALES OFFICE :
151 Craig St. West, Montreal

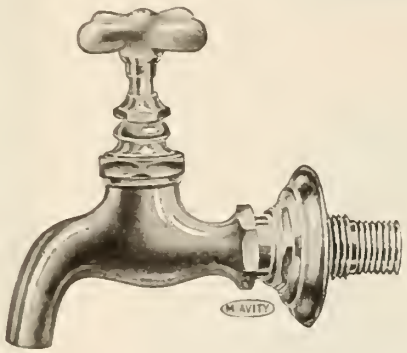


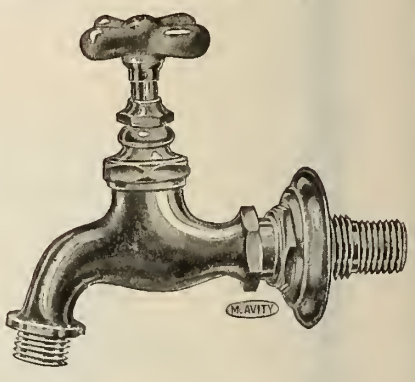
We Manufacture a good line of

All China Handle Compression Work

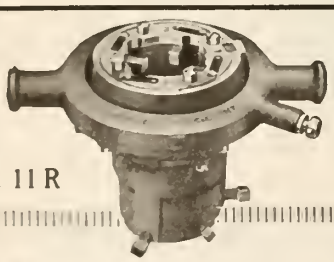
Finish and Workmanship Unsurpassed.

Prices No Higher Than a Good Article Should Be.





T. McAvity & Sons
Limited
ST. JOHN, N. B.
Montreal **Winnipeg**



No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left.

Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

"Jardine" and "Toledo" Pipe-Threading Tools

reduce the labor of pipe threading 50 PER CENT. and make threads as clean and perfect as if cut on a Lathe WITH ONLY ONE CUT.

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and cost less for repairs.
No cams or jimcracks to wear and get out of order.
Cutters that cut, don't squeeze.
Set of cutters for each size of pipe.
Lead screw ensures perfect pitch and form of threads.
Adjustable to all variations of fittings, very durable cutters.
IS NOT A TOOL LIKE THIS WORTH YOUR CLOSEST INVESTIGATION? We'll be pleased to put you in touch with users and send catalog. Write!

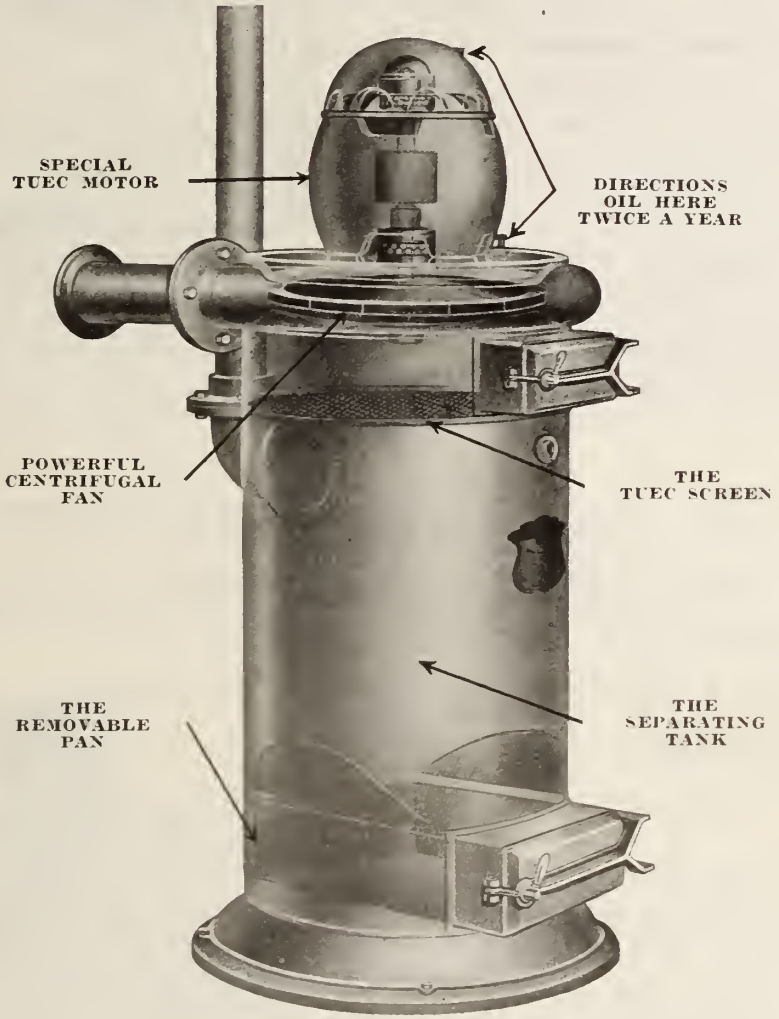
MADE IN CANADA. **All threads finished at one cut. One man does the work of two.**

A. B. JARDINE & CO.
HESPELER, ONTARIO

Sole Makers of "Jardine" Pipe-Threading Tools. Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada. Agents: Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man. Brockville and East—J. R. Devereux, 233 St. James St., Montreal.

TUEC

Stationary Vacuum Cleaner



Note the simplicity of the TUEC.

The sale of the TUEC and its equipment nets you over 25% **PROFIT**. The TUEC is the standard cleaner of Canada — its installation is very simple and you are given every assistance in making sales.

We want your co-operation in our desire to make the TUEC as much in demand as the bath-tub—it is just as essential.
Send in the coupon to-day.

THE UNITED ELECTRIC COMPANY

159 Richmond St. West, TORONTO, ONT.

TUEC received GRAND PRIZE at Panama-Pacific Exposition.

The United Electric Co., 159 Richmond Street West, Toronto, Ont.

Please send, free of charge to me, TUEC price list and discount sheet.

.....

.....

.....

Stop This Waste

The money now **wasted** by **inefficient** files would pay Canada's whole file-bill —if files were used **right.**

The **right** way is to use a file **only** to the point where **efficiency decreases.** Beyond that point, it is **inefficient.** It **wastes time.** Enough to pay for **several** new files—and leave a margin of profit beside.

To stop **file-waste** on YOUR work—enforce the rule against **inefficient** files. See that your men **promptly** replace all worn files—and use only the "Famous Five":

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

(Made in Canada)

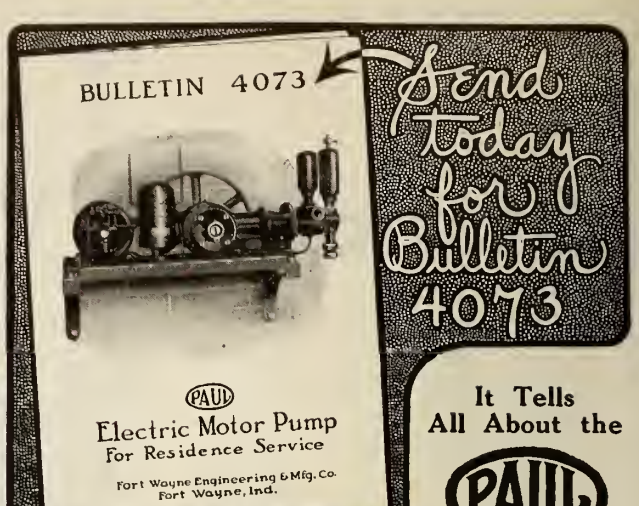
Their **efficiency** reflects our **50 years' experience.** Their **uniformity** reflects our **complete control** of every manufacturing process. Their **economy** reflects the saving of our **60,000,000** yearly output. Their **popularity** reflects the QUALITY that holds **90%** of Canada's file demand.

Stop file-waste. Turn losses into profits. Use only the "Famous Five." Catalog and "File Philosophy" **FREE** on request.

NICHOLSON FILE CO.

Port Hope, Ontario

Dealers Everywhere



It Tells All About the PAUL

ELECTRIC MOTOR PUMP

Mr. Plumber:—

Here is a perfect, low-priced electric motor pump adapted to all the requirements of the moderate priced home. Easy to install—noiseless—economical. **There's money in it for you if you push this pump.**

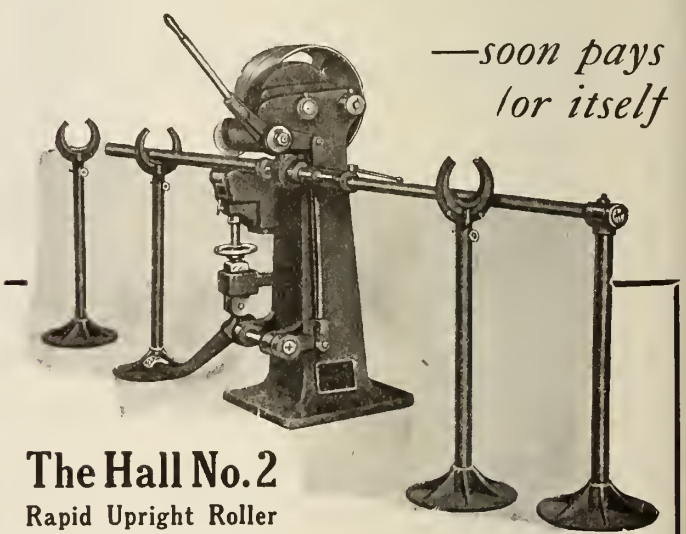
Give us your port of entry and we will quote you a price delivered to that point.

Fort Wayne Engineering & Mfg. Co. (Dept. S)

Main Office and Factory: Fort Wayne, Indiana

AGENCIES IN THE PRINCIPAL CITIES OF CANADA

—soon pays for itself



The Hall No. 2
Rapid Upright Roller
Pipe Cutter

MADE IN CANADA

Regular capacity ½ in. to 2 in., with extra cage will take ⅛ to ⅜ in. pipes. Cuts from 400 to 500 pieces of 1 in. pipe per hour.

IN A MEDIUM-SIZED SHOP IT WILL SAVE ENOUGH TIME AND PIPE TO EASILY **PAY FOR ITSELF IN LESS THAN TWO YEARS,** AND AFTER IT IS PAID FOR THE SAVINGS GO TO MAKE LARGER PROFIT.

WEIGHT, 700 LBS.

INVESTIGATE THOROUGHLY—**send for catalog and prices on all sizes, and let us put you in touch with users so that you will know how Hall machines are pleasing others.**

Delivery from stock. No delay.

JOHN H. HALL & SONS, Limited

BRANTFORD, CANADA

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

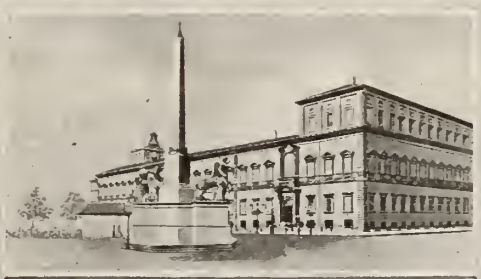
Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
20-28 Jackson Street, West

BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND



THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

Wolverine Tank Balls

—Guaranteed

The ball with the reinforced top which makes elongation impossible.

Made of the finest rubber and will outwear three ordinary tank balls.

Our full line of Quality Rubber Goods are at your command, and if you want to give satisfaction all the time, use only Wolverine goods.

Canadian Wolverine Company
Limited
CHATHAM, ONT.

THE DUNHAM SYSTEM OF VAPOR HEATING

Residence of T. Russell, Oakmount Road, Toronto. Heated by Dunham Vapor System.

"Complete Satisfaction" is the expression of the owner of this beautiful residence, in regard to the Dunham Vapor System of Heating installed.

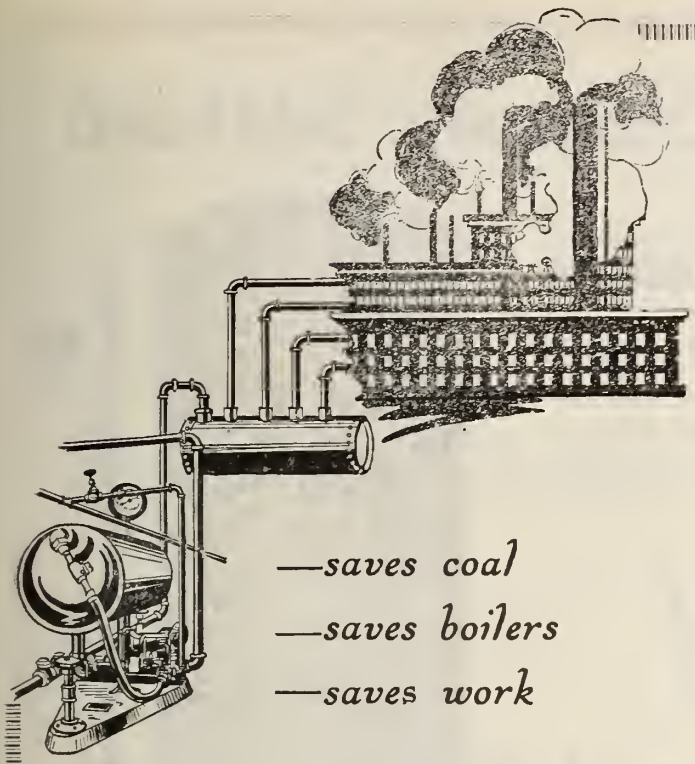
The heating contractors were surprised at the perfect working of the system upon its completion.

But the interesting part that should appeal to all of you sanitary engineers is the keynote of "Simplicity" and moderate cost of the Dunham System compared with the "just-as-good" or ordinary heating system.

We don't want you to listen to what we have to say regarding the Dunham Vapor System, we would sooner let others tell you about it. Give us an opportunity right NOW. May we send our Bulletin No. 11 together with "Information Bulletin?"

C. A. DUNHAM CO., LIMITED
TORONTO, CANADA

OTTAWA—204 Booth Bldg.
MONTREAL—Room 20, 11 St. Sacrament St.
FORT WILLIAM—Plumbing & Engineering Supply Co.
HALIFAX—Eagar, Coombs & Co., Ltd., McCurdy Bldg.
VANCOUVER—520 Duncan Bldg.
CALGARY—Metals, Limited.
WINNIPEG—405 Tribune Bldg.



—saves coal
—saves boilers
—saves work

A whole lot of progressive plumbers are increasing their knowledge by reading the "Morehead" Book. Write for your copy TO-DAY.

This picture typifies economy—

It illustrates—to the non-technical mind—the principle of the "Morehead" system as applied to the drainage of heating apparatus in buildings—large or small.

Condensation is led to the receiver by gravity—thence to the Condenser Trap from which it is discharged into the boiler feed trap.

The boiler is being fed with PURE water HOT!

On every job which includes an installation of the

Morehead Back to Boiler SYSTEM

you will supply your customer with a sure, simple means of handling the steam circulation problem—

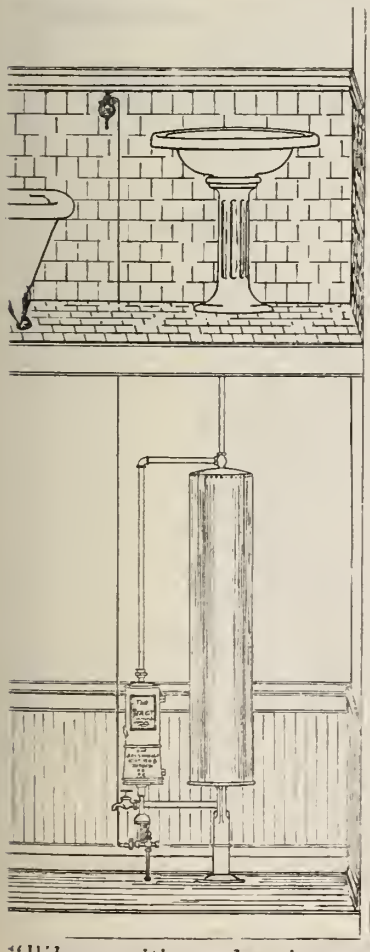
And at the same time save for him a neat sum on the yearly cost of fuel.

This is the kind of service which creates good-will—which builds business among the type of clients it pays to have.

Send NOW for the "Morehead" book.

Morehead Mfg. Co., Dept. C, Detroit, Mich.

334



Mr. "Licensed" Plumber

BULLETIN No. 2

"We are doing a considerable amount of advertising in our district with good results" — These are the words of a prominent licensed plumber, who is acting on our suggestion regarding the "Stack Water Heater." He is one of the many who realize the possibilities of this wonderful heater.

You can make business in your immediate neighborhood by a little judicious advertising—the fruit is there for the picking.

Install a "Stack Water Heater" in conjunction with a "Stack Distant Control" in your Showroom—the results will be immediate and lasting. Your clients will "thank you" for introducing to them this method of obtaining hot water—by "wireless."

Let us demonstrate this system to *you* and furnish you with all information.

The Consumers' Gas Company of Toronto

12-14 Adelaide St. W. **Telephone Adelaide 2180**

Stevens' Water Supply System

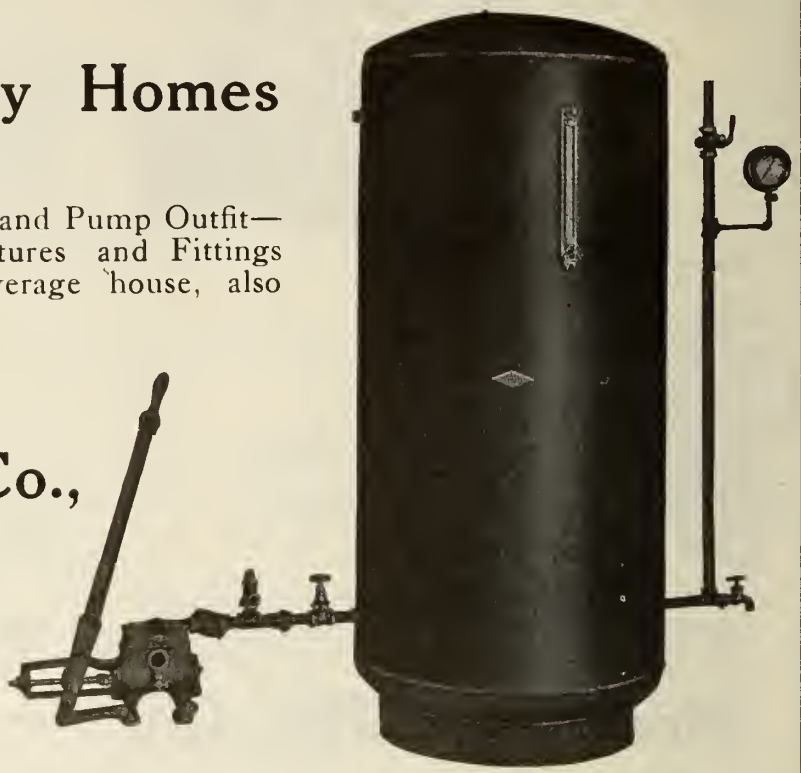
FOR

Town and Country Homes

NONE BETTER

Write for Catalogue illustrating our Hand Pump Outfit—Power Pump Outfits—Plumbing Fixtures and Fittings generally used for plumbing the average house, also for blueprint of septic tank.

We Make Prompt Shipments



The John Stevens Co.,

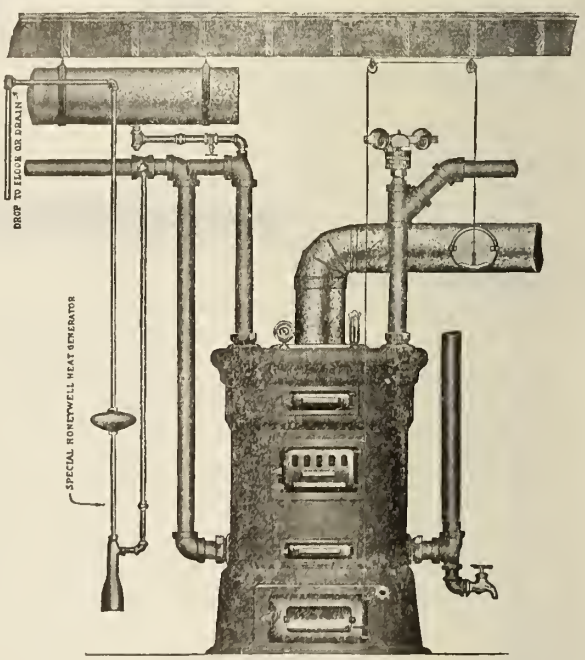
Limited

Dealers in

Plumbers' Supplies and Pneumatic Pressure Systems

661 Henry Ave. - Winnipeg

A GROWING DEMAND



Each day we receive and answer many inquiries about the Honeywell Tank-in-Basement method of hot water heating. Each day we receive and fill numerous orders for this equipment.

The popularity of the bungalow is in part responsible for the growing demand for Honeywell Tank-in-Basement equipment, because the Tank-in-Basement method is the logical solution for hot water heating problems in bungalows, one-story or flat-roof buildings where it is not always possible to place the expansion tank above the radiation on account of lack of room or danger of freezing.

Heating engineers all over the country specify Honeywell equipment — the regular method when safe or convenient to locate expansion tank above the radiators, or the Tank-in-Basement method when the reverse of this is true. Experience has taught them that the Honeywell system is the safe and dependable system to use under all conditions.

If you have put off investigating, it surely does not mean that you are not interested—why not ask us for information to-day and be prepared when the next emergency arises?

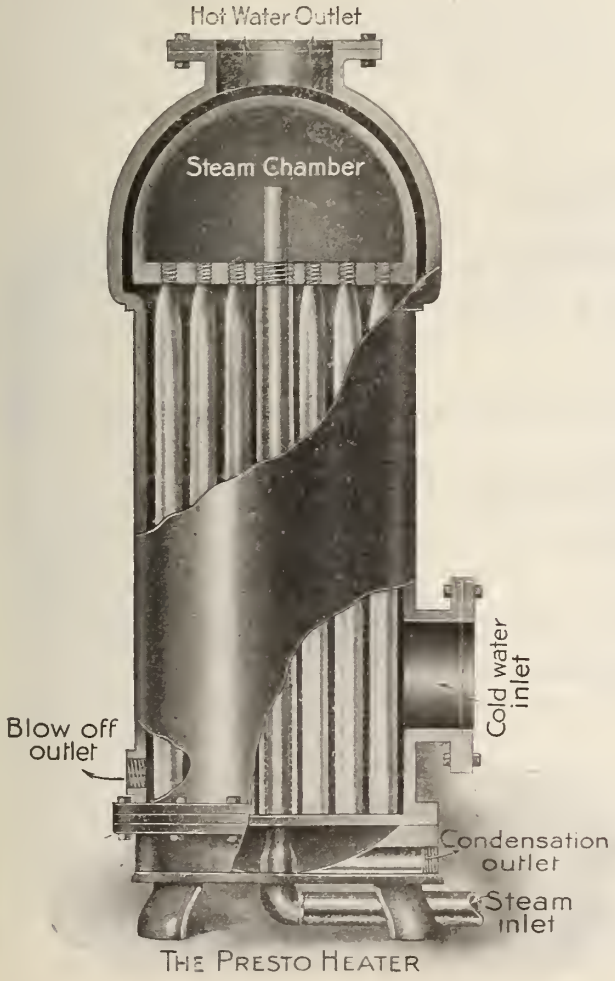
Honeywell Heating Specialty Co., Wabash, Indiana

One Manufacturer Has Declared His Intention Of Accepting Our Recent Challenge

As soon as the details are arranged, two tests will be made:

A PRACTICAL TEST at the Good Shepherd Academy, Quebec, P.Q.

A SCIENTIFIC TEST at McGill University, Montreal, P. Q.



THE PRESTO HEATER

We will pay $500.00 to any charitable institution if the following declaration can be disproved:

The "Presto" Heater will effect an economy of 25% in comparison with any other heater in the market.

The above is OUR CHALLENGE.

If any other manufacturer of a heater has enough faith in his product to accept, we would be glad to hear from him.

Harris Construction Co.
LIMITED

120 Sanguinet Street, Montreal

SANITARY ENGINEER

PLUMBER and STEAMFITTER of CANADA

Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, JULY 1, 1915 No. 13

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EDITORIAL.

Convention Week—Faulty Installations—Imagination in Business—True Patriotism—Get a Signature.

The MacLean Publishing Co., Limited

JOHN BAYNE MACLEAN, *President.* ESTABLISHED 1887 H. T. HUNTER, *General Manager*

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"VITRO"

NO TROUBLE TANKS

The kind that keeps you free from trouble and complaints.

The Vitro Tank is not in competition with any other tank.

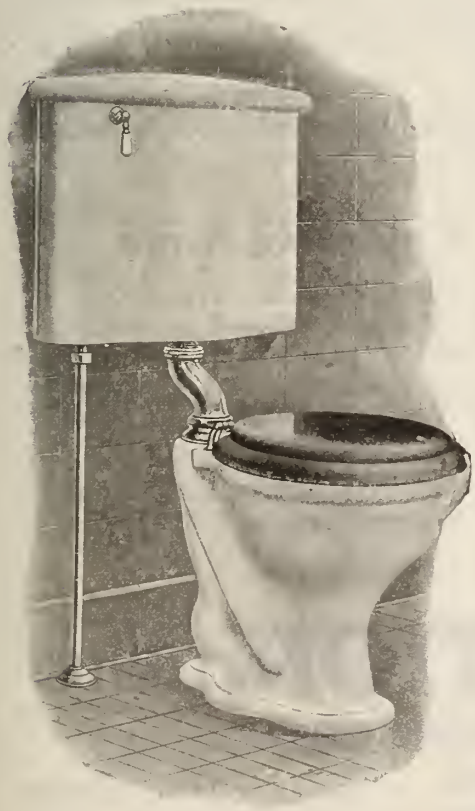
It is in a distinct class, solely its own.

No other tank can lay claims for durability and lasting service, as can the "Vitro."

Compare an 8-Year-Old "Vitro" with any other in use the same period.

Remember!!! You get more value for your money when buying "Vitro" Tanks than any other tank on the market to-day.

Chaste Design, Unequalled Finish
Reasonable Price



Over 215,000 now in Use

There are no joints to open up, nor linings to leak—nothing to get out of order, and when installed will outlast any other closet tank made.

Vitro Tanks and Fittings are built for long, good service and distinctive satisfaction.

You don't have to go back and repair them until they are worn out by **years and years** of hard usage.

They are a pleasure to install because they outwear all others.

FOR SALE BY ALL JOBBERS.

Manufactured by

CLUFF MFG. CO., LIMITED

81-111 Sterling Road, Toronto, Ont.

"KING" BOILERS

"Made in Canada"

Easier to Sell
Easier to Mount
Easier and Cheaper
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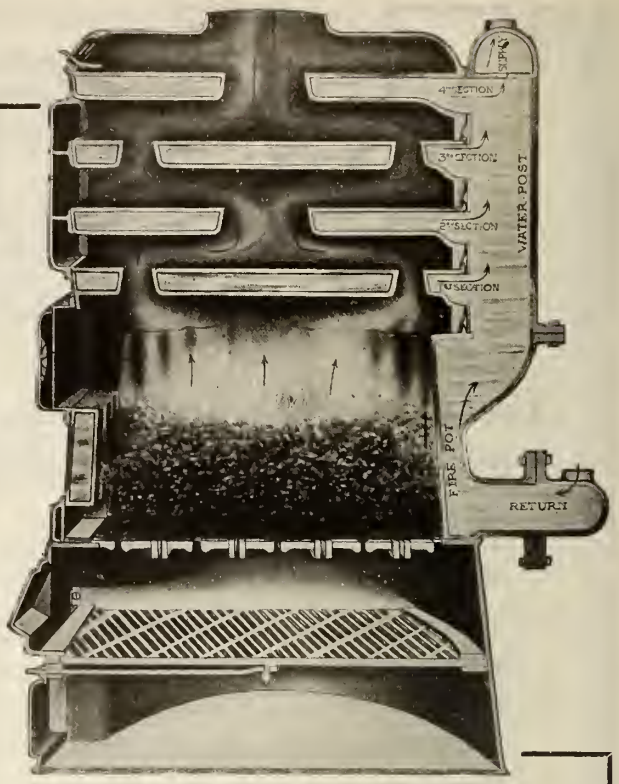

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THE SANITARY ENGINEER

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Two Strings to Your Bow

Moses Irons Explains to His Friend, Albert Pearson, How He Handled a Delicate Situation in the Jobbing Trade. An Episode That Established One of the Policies of the House.

By DANIEL LOUIS HANSON. *Illustration by CHARLES D. MITCHELL*

Reprinted from System, The Magazine of Business.

"IS it your liver to-day, Albert, or an aggravated case of the association?" There was a twinkle in Moses Irons's eye as he turned from the telephone back to Mr. Pearsons, who sat huddled in a chair looking out on Harrison Bridge approach but not seeing it.

"My liver is the best this side of the Gulf, Moses; but the association—" Mr. Pearsons fingered impatiently the cigar Moses Irons had given him a moment before the telephone rang. "It is always the association, Moses. To-day it is; yesterday it was, and to-morrow it will be the same. Even after I'm gone I know the association will not let me rest in peace. It will fix me in exactly the same way it did that French jobber down in New Orleans at whose funeral I was pall-bearer week before last. I'll be given a huge pillow of everlasting flowers, with 'Gone, but Not Forgotten,' embroidered over the top."

"Then, why not let the association alone, Albert?"

The Memphis jobber swung 'round in his chair.

"Hasn't that been my policy ever since I started in business?" he demanded. "I have ignored it from the first day. I have pretended that it didn't exist and just as I was beginning to delude myself into that belief it jabbed a hatpin into me—the kind of hatpin the European soldiers use for bayonet. Then I had to sit up and cry 'Ouch!'"

"And then?"

"Then they jump up and accuse me of fighting the association, and plumbers all over this country look at me through the tails of their eyes."

"Just which local is affecting you this morning, Albert?"

"One down in the Texas Panhandle. Knowlton is the town and as big as a lady's pocket handkerchief. That is, it looks just about that big to an outsider, but in its own opinion it's as big as—well it slops over into the adjoining states and looks upon Mexico City as a suburb."

Moses Irons was consulting a large box. "It has sixteen hundred ordinary people and three plumbers, Albert. You, a mere jobber from Memphis, should have had more sense than to fight a town that has local pride. What foolish move of yours precipitated action?"

"I tell you I wasn't doing a thing. I was enjoying an armistice: and that is what made the Knowlton Association dead sore at me. Why, Moses, I've never even sent a man to solicit the trade of the three scrappers. I didn't want their trade; I don't want it now!"

Moses Irons shook his head gravely.

"It is much worse than I feared, Albert—much worse. But go on."

"It is of course possible that one of the local officers may have called on me in Memphis, and that I, not seeing any shoulder straps or other millinery, passed him up. Or I may accidentally have thrown into the waste basket a few tickets to the Knowlton annual trade ball scheduled for the mesa on a full-moon night. I don't know that either catastrophe occurred, but at any rate my sin was one of omission rather than commission."

"I would urge you to spend time and money to get into the Knowlton bandwagon—even if you only get over the tailboard."

"I have spent both, Moses. Didn't I stop over a train on my way back from California, though it did cost me a dollar telegraphing headquarters to stop the limited. And what sort of a reception did I get? Do you know, Moses, there wasn't a one of that local offered me a cigar even. I had to pull one out of my own case!"

"You had better go to lunch, now," Moses Irons suggested to Bysbee, who went out coughing. Then, turning to his guest, "they certainly passed you the buck, Albert."

"No, they didn't, Moses—they didn't pass me a thing, I am telling you. Well, after I got back to Memphis and didn't feel quite so sore I gave Dufva expense money—fifty dollars, though the round trip cost only thirty-eight—and told him to go down and blow himself. And he did: he spent every cent, and tried to get me to O.K. another five. But they opened up to him a little: that is, enough to call me names. But I learned it from another source. They called me a 'tight wad.'"

The iron master got up to lower the window toward the river and found that it stuck somewhat.

"That is what they did, and I have made up my mind to fight them. I'll send a wire to Dufva this forenoon, and tell him to smash them. He will do it, too. His name used to be Duffy before he changed it, you remember."

"Yes, you told me that story once—" Moses Irons was again consulting the commercial agency book, — "they are rated at M4, M3, and L blank, Albert."

"I could have told you that from memory, Moses: there hasn't been a day for four months past I haven't looked them up, and I have a drawerful of special reports in addition. They are so small—confound them!—that there will be nothing left of them when Dufva gets in a good swinging right-hander at them."

"Do you really think so?" asked Moses Irons, having again taken up the red-covered book and paging it through. "Isn't it barely possible that one of the wounded may drag himself off the bloody field and wig-wag his predicament to the officers of the State Association—and they in turn relay the national officers down east? Then before long you and Dufva and the shipping clerk and all the rest of the Albert Pearsons Company will be able to enjoy all-the-year-around

hunting in the Arkansas bottoms—there will be no orders to worry about. You see, Albert, there are over ten thousand names in this book, and all mobilized for a never ending campaign against any one who injures a member."

"I am no coward, Moses!"

"Certainly not; far from it—indiscreetly the opposite, if anything. But you are not ready for that sort of a scrap even if it were necessary. You have not mobilized yet. You don't even know the lay of the land for campaigning, and, rich as you are, your exchequer won't hold out; besides banks hate to finance a concern in a fight with its customers. You aren't ready, old man, and whatever may be said about the doctrine 'in time of peace prepare for war' for nations—it still is the only maxim for a business man to swear by."

"You ought to know," said Pearsons sarcastically. "You certainly have had enough experience to speak with authority. I can recall when you were on the skirmish line three hundred and sixty-five days in the year."

"So I was, Albert, and one more, leap years. I fought and I tried diplomacy both. But I wasn't in position to wage battle, and my diplomacy didn't get in under the vest. Shirt-sleeve diplomacy does not count; the real article has to be supported with a show of power."

"That is just what I mean. Now Dufva—"

"Let me tell you about my experience, Albert," the iron master insisted.

"I knew we couldn't keep on the way we had been going. To increase our business we had to gain the respect of the trade—I didn't care a rap for its love—and to do that meant different tactics. I called in John Renwick—then, as now, sales manager—and we evolved a policy. Oh, we didn't do it in one sitting, nor did we always agree. In fact, I had to keep the hot water bag—and a mighty hot one—at John's feet most of the time.

"You know how sales mangers are—ready to carry their customers around on their backs. But we finally mapped out a scheme that turned the trick."

"If it isn't patented I—"

"You shall have it, Albert, though it has never before gotten away from my private safe. We had to work through our salesmen and apparently took them into our confidence, though the real reason, John and I kept to ourselves. At the next sales convention we explained to them that the rapid changes among customers — and they were kaleidoscopic in those days, Albert—made it necessary to look somewhat into the future. Therefore, they would be required to furnish on their next trips over the territory a list of the most likely men as possible masters among both journeymen and office assistants in every town they made. Blanks covering the essential qualifications of these reservists were ready and they were returned to us with most commendable promptness by the sales force. John and I went over these blanks and got such other information as we felt was necessary from bankers and merchants in other lines. Whenever one of the boys happened to be in the office we would talk over the situation in his territory with him and all such data was incorporated with that which we had already accumulated."

"Sort of a Bertillon system, eh? But it must have kept you busy a few evenings."

"More than one, Albert, but a system reduced the labor to the minimum. I was only afraid that the first real break might come before John and I were ready. So we walked pretty carefully, and more than once, when some local said 'boo,' we got into the trenches promptly. As luck would have it, however, no real issue was raised till everything was in pretty fair shape and the town affected—a place of fifteen thousand just across the Mississippi—one in which we had some splendid available timber. We were accused of having shipped plumbing fixtures to an undesirable dealer. That he was undesirable was putting it mildly, and that our fixtures had been bought by him could not be disputed. But we had not sold him, never had called on him, and could find no record of an order having been received from him. All of which we quickly and courteously stated to the secretary of the local association. Nor did that gentleman dispute my statements. He insisted, however, that it was up to us to find the guilty jobber who had sold the fixtures to the dealer in question. Otherwise, he stated, charges would be preferred against us."

"I have had that experience more than once," said Pearsons.

"I took the bull by the horns and went out to lay our case before the state association. There I met with pleasant treatment, but could not get the officials to see the matter in my light. In other words, they believed they had discovered a cheap and efficient method of getting their detective work done for nothing. I was warm under the collar, and so started east to have it out with the executive committee of the national association. There also I met a welcome and but little consolation; the case had not yet come to it from the state association, and the various members did not care to pass an opinion till they had heard the other side. Nor would they give an opinion in a hypothetical case. All the advice I got was, 'better fix it up with the local before it gets to us.'

"You, a mere jobber from Memphis, should have more sense than to fight a town that has local pride.

"Back to the firing line I went, therefore—it goes to show that the man with the big stick is often more patient than the one who has only a bluff with which to fight. The local, however, looked upon my return as a sign of surrender and began to be cocky—in fact, one of the three men was positively offensive. Whether our having turned down an order from him a few months earlier because of credit reasons had anything to do with his insolence I can't say. But I went back to Chicago determined to fight. It was a good time to try out our new scheme."

"Didn't Renwick buck?" asked Pearsons.

"No, sir; John's spinal column had been stiffened by the work we had been doing for months past. Well, events moved fast. We were posted, and in less than two weeks from the day that

happened a new plumbing shop opened in the home town of the scrapping three. The proprietor was the best plumber in that locality and had figured for some time on just such a move. We simply pushed the event ahead a year or so. At our suggestion the young chap applied for membership in the local. He was refused and took his case to the state association. That referred it back to the local, which refused to either act or give reasons. Well, I'll not tire you with the narrative of what happened—at last he was admitted to the state association and the local was put under discipline. The local appealed to the national association, and as the affair by then involved a dozen jobbers—we had seen to it that our young friend had scattered his orders—two of the national executive committee came out to disentangle the snarl."

"And that gave you a chance?" suggested Albert Pearsons.

Co-operation between manufacturer, jobber and merchant is the secret of success for all.

"That it did, Alberta. They paid me a call, and I saw to it that they went away with an impression of both our business capacity and also with some idea of our ability to hit twice as hard as we were hit. I let them see enough of the card system that John and I had devised to cover just such situations as the one which then confronted us. Without letting them think that I believed they would understand its real purpose, I gave them more than an inkling of what we really could do when put to it. After that I wasn't worried by their going out west. I felt they believed in the fair-mindedness of Moses Irons and Company, as well as in its determination not to be walked over."

"Did they say that to you?"

"No, but they did to Dillon—that was the young master plumber's name—the one we gave a boost to. They were very complimentary about us to him, and they read the riot act to the scrapping three."

"And the shipment which caused all the trouble?" asked Pearsons.

"It was fully a year before we solved that. The one receiving it, a man who clearly was not entitled to buy that class of stuff, had a brother-in-law out in Kansas—a regular master plumber and a member of the association—and it was he who had shipped in the fixtures. When that information came to us we got up a letter about it and sent it to each and every plumber whose name appeared in the national directory."

"But you have had troubles since then?"

"Sporadic cases, but not epidemics of them as before, Albert. I don't believe the trade loves us to-day, but it respects us as a concern which aims to do the square thing and expects the same measure from its customers. You are asking if it has paid us. Well, we were doing a million a year then and the bulk was cheap stuff—staples. To-day we are doing nearly four million annually and, as you know, we have been for some time the leaders in the high-grade fixtures, in which there is velvet."

"Then the system is still working?"

"I would not try to do business without it. It seldom is used as a club, but it has other values which more than makes it self-supporting. It keeps all of us alert to something more than to-day's needs; it gives us the far look ahead. It gives us poise; we handle ourselves more carefully. We know our strength and don't let go of ourselves as easily as in the old days.

"I believe, too, that through it we have helped to grade up the trade. You know that occasionally there is a town that does not line up with its neighbors. Cheaper fixtures and less careful installation are the rule; business methods are lax and collections on the part of us supply men most undesirable. The trouble is that a few old moss-backs dominate the business in such places and we manufacturers as well as the public suffer. In such places we are able because of our system of gathering information to be of distinct service to the community and to the wholesaler. We are able to pick the new men, the ones with initiative and with red blood coursing through their veins."

"But how is your experience going to help me to decide about that Texas town?" Pearsons urged dismally.

"Your case is easy!" exclaimed the iron master. "It is simply one of salesmanship. Turn Dufva loose with some time and money and he will put that place on the map for you. The next time a visitor, whose name appears in this book, looks in on you in Memphis, give him a day's shooting over in the Arkansas bottoms and restrain yourself from pointing your gun at him. Later give him a dinner at the Gayoso."

"I don't know—"

"But I do, Albert; and take it from me in this. Don't fight till you have something to fight about—and not even then unless you are thoroughly equipped for a thundering big job and can afford getting licked. The trade in the main—ninety-nine and ninety-nine hundredths per cent.—aims to be fair and expects nothing in the way of premiums from us supply men. It simply wants the load that all of us are pulling to be fairly distributed. Once in a lifetime you may be called upon to knock some obstreperous individual into a cocked hat, but then swing the big stick carefully and without prejudice. Be sure that you are holding the loaded end farthest from you. Then swing it, but speak softly at the same time. Diplomacy in affairs international may be dead, but in business its day is just breaking."

"But—"

"And then, Albert, hit the one you are aiming at. Good customers are scarce with all of us—and be careful of the non-combatants. Don't be a trade anarchist."

AWARDED GRAND PRIZE.

The United Electric Co., Toronto, have been notified that the International Jury of Awards for the Panama-Pacific International Exposition have awarded the Tuec stationary cleaner the grand prize, and added "that this prize is awarded to the exhibits receiving the highest marking." There is but one grand prize in each class.

New Brunswick Annual Convention

A Splendid Convention all Round, Lively Discussions Took Place—New Officers Were Elected and Place of Meeting for Next Year Was Decided Upon.

THE Annual Convention of the New Brunswick Society of Domestic Sanitary and Heating Engineers was held in McLaughlin Hall, 140 Union Street, City of St. John, N.B., June 21, 1915, Mr. D. J. Shea, President, in Chair. Morning Session opened at 10 o'clock. Edward Hurley, of Fredericton, Secretary-Treasurer, was unable to be present. The President asked if any member would be kind enough to volunteer to act as Secretary pro tem. Mr. W. J. Crawford, Secretary of St. John local, agreed to act as secretary.

The President appointed as a Credential Committee Messrs. Blake and Brooks, who reported that all present were entitled to take an active part in the proceedings of the sessions. Minutes of last meeting held at St. Stephen, N.B., last year, 1914, were read.

The motion made by Mr. Brooks, Moncton, seconded by Mr. Doyle, St. John, that the minutes as read be adopted, was carried.

Mr. F. W. Noble asked that his name be taken off the Committee as a delegate to the Canadian Convention which meets at St. John, June 22-24. The President requested Mr. Noble to kindly have this matter left over until the afternoon session.

Roll Call.

Those present at the morning session were: President Shea, Fredericton; Messrs. Dorman, Eastano, Watson, McCarthy and Brooks, of Moncton; W. H. Thorne being the delegate present for Sussex; Messrs. Blake, Emmerson, Walker, Doyle, Noble, Fitzgerald and Crawford represented the St. John society.

Communications.

The next order of business was the reading of communications. The Secretary reported that there was no communication on the table. President Shea gave a verbal report stating that Mr. Hurley had neglected to send the communication, but that he knew its purport and he gave an outline of the past year's work. G. S. Dorman, of Moncton emphasized very forcefully the fact that the members did not realize the benefits to be gained by joining the association. Mr. Brooks, of Moncton, also outlined various principles of association work and asserted that members should carefully consider the qualifications desirable for membership of the association.

Audit Committee.

An audit committee was appointed, comprising Messrs. Walker, McCarthy and Doyle.

Messrs. Brooks, Fitzgerald and Watson were appointed as a Ways and Means Committee.

F. W. Noble, St. John, stated what the conditions of the trade were in the province at the present time and said that in St. John there was practically no work this summer. Mr. Noble urged that the association should receive 5% discount off on lead pipe in place of 2% as at present.

Moved by Mr. Crawford, seconded by Mr. Brooks, that in future, members not taking any interest in Association work or assisting in carrying out the work should have their names taken off the membership roll, and also that the incoming secretary notify them that a full list of members is to be sent to the manufacturers and jobbers throughout Canada (Carried).

Moved by Mr. Blake, seconded by Mr. Doyle, that these lists be sent to the manufacturers and jobbers who were in accord with us.

Auditor's Report.

The Audit Committee reported that they had examined the books of the Secretary-Treasurer and found them and all accounts correct, with a balance on hand of $43.51.

Morning Session Adjourned.

After a general outline and discussion of association work, it was moved, seconded and carried to adjourn until the afternoon session at 2 o'clock. D. J. Shea, President, W. J. Crawford, Secretary, pro-tem.

AFTERNOON SESSION.

At the afternoon session, Mr. D. J. Shea in the chair, the minutes of the morning session were read and adopted.

The Ways and Means Committee reported verbally and asked to have the report adopted as they wished to have accounts in and make up estimates for the coming year.

Those present at the afternoon session were: Messrs. Shea, Blake, Watson, Campbell, Fitzgerald, Thorne, Ilington, Emmerson, Noble, Dorman, McNeally, McCarthy, Brooks, Doyle, Steeves, Walker and Crawford.

Canadian Delegates Appointed.

It was resolved that the delegates for Canadian Convention be appointed and that the chair make the appointment with substitutes.

The following were appointed: Messrs. Noble, Brooks, Fitzgerald, Thorne and Steeves, with Walker and Crawford as substitutes.

Moved by Mr. Blake, seconded by Mr. Crawford, that delegates act as a resolution committee and meet together immediately to draw up matters to present before Canadian Convention to-morrow.

Reports of the following committees were all given verbally: Sanitary, Heating, Arbitration, Legislation, Application and Credential; with the exception of Sanitary and Legislation others reported progress. Sanitary and Legislation Committee reported and recommended that matters be left with Board of Health and legislation to try and enforce the law relative to closing up unsanitary dwellings.

Abolish Main House Trap.

They also would like to see the law changed so as to dispense with the main house trap and breather entirely. The very best authorities on sanitation were not favorable to the main house trap and breather, and St. John should be up-to-date. This matter was left over to be brought up by a representative on the Provincial Board of Health. The Resolution Committee here reported, Mr. Brook as Chairman and R. E. Fitzgerald as Secretary:

Moved by Mr. Dorman, seconded by Mr. Brook, that E. H. Russell, of London, Ontario, be given privilege to address the members present. Carried.

Mr. Russell was given a very hearty reception. He gave a very able address, thanking the members and congratulating them on their strict order of business. He dealt at length with the Ontario Woman's Compensation Act which was very heartily appreciated.

Place of Next Meeting.

New business being next in order, the question of reconsideration of the annual meeting of the Provincial Association and of reverting to the semi-annual meetings was gone into. The following spoke very forcefully on the matter, some for and some against: Messrs. Dorman, Noble, Crawford, Brooks, Shea and Fitzgerald. Moved by Mr. Dorman and seconded by Mr. Ilington, that the meetings be held semi-annually at a stated place of meeting, that stated place to be St. John, in January and July, as was originally the case, according to the Constitution Act, further that no local have any entertainment at these meetings.

Moved by Mr. Noble and amendment seconded by Mr. Steeves that the meeting be held annually and that time and place be decided upon.

Moved by Mr. Blake, seconded by Mr. McNeally amendment to amendment, that the meeting be held annually, place to be decided.

Amendment to amendment being put, it was carried by a standing vote, the amendment and original motion being lost.

Moved by Mr. Crawford, seconded by Mr. Blake, in January, 1916, the meeting be held at St. John, according to time in constitution. (Carried).

Election of Officers.

Next order of business was election of officers.

It was moved by Mr. Noble and seconded by Mr. Blake that D. J. Shea, Fredericton, still occupy the Presidential chair for next year. (Carried).

On ballot being cast, Mr. Shea was re-elected President.

Moved by Mr. Shea, seconded by Mr. Brook, that R. E. Fitzgerald be nominated for Vice-President.

Moved by Fitzgerald, seconded by McNeally, that Wm. Watson be nominated for Vice-President. Mr. Fitzgerald declined the nomination. Ballot was cast for Watson. Moved by Brook, seconded by Walker, that R. E. Fitzgerald be elected Secretary-Treasurer. Moved by Walker, seconded by McNeally, that F. W. Noble be nominated sergeant-at-arms.

New Officers Elected.

D. J. Shea, Fredericton, N.B., President; W. Watson, Moncton, N.B., Vice-President; Fitzgerald, St. John, N.B., Secretary-Treasurer; F. W. Noble, St. John, N.B., Sergeant-at-Arms.

The following members were appointed to act on the various committees for the year 1915-16:

Sanitary Committee—Messrs. Walker, Noble, Shea.

Heating Committee—Messrs. Thorne, Crawford, Webster.

Arbitrative Committee—Messrs. Brooks, Dorman, McCarthy, McNeally.

Legislative Committee—Messrs. Shea, Noble, Dorman, Steeves.

Apprenticeship Committee—Messrs. Watson, Brooks, Estabd, McCarthy, Dorman.

Credential Committee—Messrs. Dorman, Crawford, Emmerson.

Examination Committee—Messrs. Blake, Steeves, Crawford.

Moved by Brooks, seconded by Crawford, that a Trade and Commerce Committee be appointed. Carried. The following were appointed: Trade and Commerce Committee—Brooks, Emmerson, Noble, Steeves and Doyle.

Ways and Means Committee here reported that assessment for next year will be $5 per capita.

Moved by Brook, seconded by Fitzgerald, that Legislation Committee get active and be prepared for Workmen's Compensation Act when it comes before them.

Mr. F. W. Noble moved that all expenses for the past year be paid. Moved by Dorman, seconded by Thorne, that per capita dues for year 1915-16 be paid to Canadian Association Society-Treasurer not later than to-morrow, the 22nd of June.

This convention was considered one of the best yet held by the society, much profitable business experience being gained and also the name of a new firm being added to the membership roll, they being in a new district. The firm of Myers & Thorne were very much welcomed. Mr. Thorne being present showed that he was well worthy to be a member. The St. John local association extended a hearty invitation to all members present to take part in the entertainment being prepared for the delegates of the Canadian society who would be in convention the next and following two days.

Before concluding the convention a very pleasing event took place in the presentation to Brother F. W. Noble, St. John, the newly-elected Sergeant-at-Arms, with a gold signet ring, turquoise stone; and Brother F. S. Walker, St. John, past Sergeant-at-Arms, with a gold signet ring, with ruby stone.

These events brought the New Brunswick convention to a close.

Twentieth Annual Convention of Canadian Society of Domestic Sanitary and Heating Engineers

A successful convention—Many matters of Importance Taken up—Society Stronger Than Ever—Splendid turnout of delegates from Ontario, Quebec and Maritime Provinces—P.E.I. sends every member engaged in the trade, they all being members of the society—Several of the original charter members present which gave a great stimulus to the proceedings—A great number of manufacturers and supply houses were ably represented.

THE twentieth annual convention of the Canadian Society Domestic, Sanitary and Heating Engineers, was held in McLaughlin Hall, Union St., with a large representation of members from all parts of the Dominion. The president, Geo. S. Dorman, was in the chair. George Blake, president of the St. John local association, extended a hearty welcome to the visiting delegates and hoped that they would enjoy the program of entertainment provided by the local society. He said this was the first time in the history of the city that the Canadian association had met there and he trusted the visiting members would take the opportunity of seeing the beauties and the historic spots of the city and the surrounding country before they left for their homes.

President Geo. S. Dorman thanked the speaker and the members of the local society for the welcome extended to them and for the preparations of entertainment provided by the St. John members. Mr. Dorman asked that every member would be present at the afternoon session as it was expected to have his worship the mayor with them to formally open the convention.

Executive Meeting.

The remainder of the morning was taken up by a meeting of the executive of the Canadian society. The members of the executive were: Geo. S. Dorman, Moncton, president; E. H. Russell, London, Ont., vice-president; L. H. Estano, Moncton, secretary-treasurer.

The next business taken up was that of appointing members to act upon the various committees while the society was in convention. Those chosen were as follows:

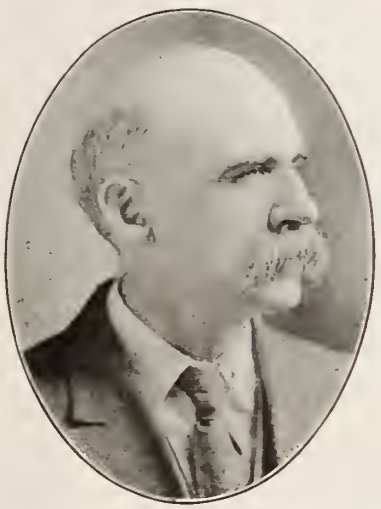
Credential.—Messrs. Jno. Watson, Montreal; L. H. Estano, Moncton; F. S. Walker, St. John.

The latter was appointed by the chairman with instructions to examine the credentials and report to the convention at once. This was done and the following delegates were reported present:

Quebec.—John Watson, John A. Gordon and A. Charette, all of Montreal.

Ontario.—John McKinley, Ottawa; E. H. Russell, B. Noble, John Eggett, A. E. Gibbons, London, and G. F. Frankland, Toronto.

New Brunswick.—E. N. Brooks, G. S. Dorman, W. Watson, L. H. Estano, J. W. McCarthy, Moncton; F. W. Noble and A. E. Fitzgerald, St. John; Earl Steeves, St. Stephens; W. H. Thorne, Sussex; D. J. Shea, Fredericton.



E. H. Russell, London, newly elected president of the Canadian S. of S. and Heating Engineers.

Nova Scotia.—John E. Godwin and Mr. Day, Halifax; F. Powers, Lunenburg.

Prince Edward Island.—W. Murnaghan and D. R. H. Shaw, Charlottetown; W. J. Morrison, Summerside.

The president then called upon G. F. Frankland to assist secretary Estano in his duties. Mr. Estano having just recovered from a very serious illness. The roll was then called and the following members responded:

D. J. Shea, Fredericton, N.B.; G. S. Dorman, Moncton; Wm. Watson, Moncton; J. W. McCarthy, Moncton; L. H. Estano, Moncton; E. N. Brooks, Moncton; Earl Steeves, St. Stephen, N.B.; Hugh Marquis, Cambelltown, N.B.; F. W. Noble, F. S. Walker, Geo. Blake, W. J. Crawford, P. Campbell, W. E. Emerson, J. Buckley, Geo. W. Williams, D. Doyle, John S. Coughlan, J. S. Coughlan, R. E. Fitzgerald, H. Doody, E. N. Herrington, D. Peer, J. J. McNeally, all of St. John, N.B.; W. H. Thorne, Sussex, N. B.; John E. Godwin, Michael Day, J. W. Evans, Halifax, N.S.; Frank Powers, Lunenburg, N.S.; D. R. H. Shaw, W. Murnaghan, Charlottetown, P. E. I.

The afternoon session opened at two o'clock with the president in the chair. He opened with a short address of welcome and was followed with an address by H. R. McLellan, commissioner of public safety, who extended greetings to the delegates on behalf of the city.

Mayor Unable to Attend.

He came to address them, he said, as a deputy of his worship the mayor, who had expected to be present, but, unforseen matters had come about which could not be set aside and which required the personal attention of his worship.

The commissioner said he fully appreciated the work which was being done by the local society of sanitary engineers. As commissioner of public safety he said:

"The first problem to deal with in every community is that of the health problem. It was a matter of public safety and therefore should be given due and earnest consideration. Sanitary engineers, he thought more than any other class, were necessary to safeguard the health of the citizen.

Several cases had been brought to his knowledge and he was very well reminded by the fact that co-operation between his department and the local association had greatly improved conditions in St. John, and he hoped that the local society would prosper in the good work

they followed, and he knew that there was much that could still be done by them in St. John. He closed by wishing them every success and trusted that they would enjoy themselves during their stay in the city.

He then withdrew from the meeting and the president called those members present to order and appointed the following to act on various committees:

Resolution Committee—

E. H. Russell, London, Ont.
F. W. Noble, St. John, N.B.
Michael Day, Halifax, N.S.

Select Committee—

B. Noble, London, Ont.
P. Campbell, St. John, N.B.
W. Murnaghan, Charlottetown, P.E.I.

G. S. Dorman, Moncton, N.B., past president of Canadian Society.

Audit Committee—

John Watson, Montreal, Que.
J. E. Godwin, Halifax, N.S.
D. J. Shea, Fredericton, N.B.

Nominating Committee—

John A. Gordon, Montreal, Que.
John McKinley, Ottawa, Ont.
D. R. H. Shaw, Charlottetown, P.E.I.

Having appointed the various committees aforementioned, the reports after being read were handed on to the different committees to be passed upon and in this way the business of the convention was put through in good style.

President's Address.

The president, G. S. Dorman, then proceeded with the regular business and referred to the serious times our country was passing through.

Since the last convention which took place in Ottawa, the country had been plunged into war, the worst that had ever been waged in the history of humanity. No one had the slightest idea that within a few weeks from the time the society last met, that such a war would be in progress. This had as was to be expected seriously hampered association work, particularly in the western provinces.

The building trade is now practically at a standstill. People are not spending money as they should. The whole country has, as it were, turned to war, and we're going to wage it to a victorious end.

In spite of this, the association has made considerable headway. Montreal, he was sure was as solid as ever. Manitoba members had sent in their regular dues and were in the hope that they would be in a stronger position next year.

The Ontario society is doing splendid work and also becoming stronger every year. Somehow, said he, this war has not only cemented every part of the Empire together, but it seems to have brought the members of the Canadian society together.

Nova Scotia was to be complimented on the way its members were working, and Prince Edward Island society too was in a very enviable position, in that every sanitary and heating engineer on the Island was a member of the association.

New Brunswick has just held its annual convention, and no doubt would be able to report progress when the time came to do so. Saskatchewan was still with the Canadian body, and would be in a better position next year.

It must not be forgotten that the provinces further west had suffered severely, and those in the trade were no doubt finding business in a poor condition.

James Marr, Alberta, wrote the secretary that as far as association work was concerned, it was not quite as interesting as it might be, all of which was due to the war.

He (Mr. Marr) personally had been very busy indeed with technical school work, and found it very interesting. Some of the work in this connection had been published in The Sanitary Engineer of June 15 issue, which would prove to those present that there was no time to waste when teaching the rising generation of sanitary engineers how important a calling they were to be engaged in. The meeting was adjourned until 9 a.m., Wednesday, June 23rd.

ENTERTAINMENT COMMITTEE.

Members St. John Local Association.

George Blake, R. E. Fitzgerald, Frank S. Walker, Wm. J. Crawford, Fred W. Noble, John S. Coughlan, Peter Campbell, Wm. E. Emerson, Jeremiah Buckley, Ed. N. Herrington, Daniel Doyle, Wm. B. McDonough, David Peer, George W. Williams, Harry J. Doody, Thomas P. Kane, Hezekiah Codner, John J. McNeally.

Reception Committee.

The members of the Reception Committee were D. J. Shea, Ed. Hurley, R. H. O'Brien, Walter Sentiner, Geo. Waudless, all of Fredericton, J. Fewer and J. P. Pickles, Woodstock; Hugh Marquis and W. H. English, Campbellton; Earl Steeves and H. L. Regan, St. Stephen; Wm. Watson, J. W. McCarthy, and E. N. Brooks, Moncton.

The visiting delegates with their wives were the guests of the local association at a theatre party in the Opera House. There were about one hundred and fifty in the party and they thoroughly enjoyed the excellent production of "The Mills of the Gods," by the Orpheum Dramatic Stock Company.

John McKinley, Ottawa, delegate to the 20th annual convention, St. John, N.B.

WEDNESDAY MORNING SESSION.

The first business taken up was that of election of new officers which resulted in the following members being elected for the current year 1915-16.

It might be well to mention that previous to the election of officers the place at which the next convention was to be held was decided upon, this was done so as to be able to choose men located in the chosen city. It was unanimously decided to hold the twenty-first annual convention in London, Ontario. This was kept in mind when the new officers were nominated and finally elected.

NEWLY ELECTED OFFICERS.

President—E. H. Russell, London, Ont.

Vice-President—D. J. Shea, Fredericton, N.B.

Secretary-Treasurer—B. Noble, London, Ont.

Provincial Vice-Presidents.

Alberta—James Marr, Calgary.

Manitoba—A. J. Hammond, Winnipeg.

Saskatchewan—N. B. Roantree, Swift Current, Sask.

British Columbia—J. A. Anderson, Vancouver, B.C.

New Brunswick—W. J. Crawford, St. John, N.B.

Nova Scotia—John E. Godwin, Halifax, N.S.

Ontario—H. Hicks, Toronto, Ont.

Prince Edward Island—D. R. H. Shaw, Charlottetown, P.E.I.

Quebec—A. Charette, Montreal.

Chairmen of Committees.

Apprenticeship—John Watson, Montreal.

Essay—L. H. Estano, Moncton.

Heating and Ventilating—R. J. McCauley, Montreal.

Legislative—A. Currie, Ottawa.

Sanitary—Angus McDonald, Stratford.

Mr. Frankland then read the report from Geo. Clapperton, Toronto, chairman of the Apprenticeship Committee.

APPRENTICESHIP REPORT.

Canadian Society of Domestic Sanitary and Heating Engineers in Convention at St. John, N.B., June 22nd.

In submitting this paper on the apprenticeship question, your committee feels that the time has arrived when the old system or systems in vogue have become antiquated. We believe the oldest and best system was the indenture system, which we can all safely say, is a thing of the past, as far as the plumbing and heating trades are concerned.

There is no doubt that this system served its purpose splendidly in days gone by, but there is a disclination now by both employer and employee to apply it.

There are many reasons for this, chief of which is, perhaps, the changed conditions of affairs in the trade generally. The indenture system is still being used for various trades but we understand, only with varying success.

We are satisfied that the plumbing and

(1) A. Charette, Montreal. (2) Left to right, J. W. McCarthy and W. Watson, Moncton, A. Charette, Montreal, Earl Steeves, St. Stephen, N.B. (3) Messrs. Shaw and Murnaghan, Charlottetown, P.E.I., D. I. Shea, Fredericton, N.B. (4) Jno. Watson, Mrs. and Mr. Jno. A. Gordon, Montreal. (5) London delegation, B. Noble, A. E. Gibbons, E. H. Russell, John Eggett; with John Watson to the extreme right is Wm. Darling, representative of Empire Brass Mfg. Co., London. (6) W. Ramsay, rep. Jas. Robertson Co., St. John, N.B. (7) The ladies being escorted by G. S. Dorman to an afternoon's ride into the country, which afterwards proved to be more in the line of a bath. (8) W. J. Evans, W. Morrison and M. Day, Halifax, N.S.

heating trades have assumed a higher standard to-day than ever before, this is largely due to the increased and growing importance of heating and sanitation generally, and with this growing importance, the writer feels that everything possible should be done to assure that a continuous supply of skilled mechanics are being trained to do the work, that this will be best done through thoroughly training and developing both physically and mentally the apprentice, there is little doubt. This can best be done through the aid of the technical school. The apprentices, however, will not, as a rule, take a decided interest in this work unless they feel they have the sympathy and co-operation of their employer. Perhaps a resume of the history and value of technical schools and training would not be amiss.

Technical schools are not schools for the study of science, but schools in which the principles of pure science are applied to practical operation. By technical schools we refer to what is commonly know in England as trade schools.

The need of technical education for our young men is being emphasized more and more every day; boys are not coming forward as readily as in the past. The reason for this is perhaps obvious. The rapid growth of our country has made skilled labor somewhat rare and the boy to-day can pick and choose trades perhaps more to his liking than that of plumbing or heating. The writer believes, however, that this is mainly due to ignorance of working conditions of the trade on the part of the boy or his parents. There may not be, perhaps, the same glamor attached to our trade as to others, that might be mentioned, and this is probably due to native born ignorance, the plumber, to the ordinary boy's mind being associated with the man who "Clears the drain," or "Puts new washers on the taps."

Comparatively few parents know enough to make intelligent choice for their sons, and most men with means enough, give their children a college education, and they then follow the beaten path.

Goethe said, "I do not know whose mind ought to be larger and more refined than the mind of a real merchant."

Mental and moral training, as such, have only incidental place, yet such training is as inseparable from their work as muscular training is inseparable from apprenticeship to blacksmithing.

While we have been providing most excellent executive and administrative officers, skillful engineers, the rank and file of our trade has been neglected, having had no training such as is given in European countries. We recognize no trade or technical school can turn out a finished and efficient journeyman, but it can furnish the material out of which such a journeyman can be made.

It is a fact to be regretted that our trades or professions, which constitute in value about 20 per cent. of a structure, are not taught scientifically in any school in Canada. We have schools for everything else, veary nearly, that one can think of, and yet to date our trade is not being taught scientifically in any school in Canada.

It can be shown to anyone who cares to look into the matter, and who can appreciate the entire premises that the trade school student can be made better fitted in every way to meet life than the ordinary commercial apprentice, because he is taught not only the "How" side of his trade, but the "Why" as well.

How many practical men, holding executive positions in our trade to-day are there who have not felt the lack of some technical training, the most of these are men who have risen to the top ranks through sheer force of brain power, and yet the majority of these men have felt at times that they would have had an easier work to perform through life had they had technical training in their youth.

The co-operative system, or part time, by which the boy shall spend one or more afternoons of each week in school, the writer believes, is a logical solution. By this system certain boys may be selected who have shown ability and a desire to learn, and may be sent to technical schools and taught the theoretical knowledge of their trade. The expense of training may be borne in whole or in part by the employer. It is the writer's belief that the employer would be repaid many times by the increased efficiency of the boy, and the added incentive, due both to the kindled interest and the de-

James Marr, Calgary, elected provincial vice-president for Alberta.

A. J. Hammond, Winnipeg, elected provincial vice-president for Manitoba.

sire to put into practice that which he has learned at school.

As to what the boy should be taught. It is not the intention of this paper to set forth an exact curriculum, but among the subjects no doubt would be mechanical drawing, elementary chemistry, workshop mathematics, lectures on topics pertaining to his trade, hydrostatics, hydromechanics, physics, etc. It may be mentioned that in Toronto, the executive officers of the Ontario Society of Sanitary Engineers are co-operating with Principal McKay of the Toronto Technical School and it is hoped that by the time the new technical school is completed there will be some such course agreed upon, to the mutual interest of employer and employee. It is expected that the Toronto Technical School, which has cost well over a million dollars, will be, when completed, one of the finest of its kind on the continent.

In the New York Trade School, one of the finest of this type, charge is made for tuition, the charge however, being purely nominal, both practical and theoretical training is given. By this system a course is arranged so that not only is skill quickly acquired, but the scientific principles that underlie the

John Watson, Montreal, one of the charter members appointed chairman of Apprenticeship Committee.

work are also studied. The tuition fee is $40 for the course of plumbing or heating. Evening classes are given three nights each week; applicants are between the ages of 17 and 22 years. In the course of steam and hot water heating, an attendance of three consecutive months is required in the day school, or two consecutive terms of six months each in the night school before a certificate is granted. No co-operative system between employer and employee is worked out so far as the writer is aware. In the day classes of 1902 of 223 pupils 131 were studying plumbing and heating. Of 448 pupils in the evening classes 185 were studying plumbing and heating. From the above it may be gathered that the plumbing and heating course was a very popular one.

Jno. E. Godwin, Halifax, elected provincial vice-president for Nova Scotia.

In a large technical school in Cincinnati, the boys work one week in school, and one week in shop. In this school they are taught things that seldom come up in practice and in the shop they are taught things which are very hard to teach in schools. The Cincinnati system has been very successful. Boys on half time indicated have done fully three-fourths as much, and far better work as far as they went, than was done by boys on full time in the shop.

Besides building us up economically and industrially, this kind of education is sure to contribute much to the uplifting and upbuilding of our workers. With this running as it is running elsewhere, in this atmosphere charged with progress, prosperity will walk hand in hand with education in all our hills and valleys. The plumber or the steamfitter will be a better man for such a course. When our trained man learns to go to the mine for the raw material, and learns the large laws that were in the life of the world long ago, and then runs his eye over and up the finished structure that bears the imprint of his work, and sees that all this means progress and prosperity in all that is best and highest in the thing, called civilization, his life will undoubtedly be larger and better. Out of it will come a new revelation of his powers and destiny: he will have an entirely different appreciation of existence.

We owe it to ourselves, as much as we do to our boys, to see some such system as we have roughly outlined, successfully inaugurated and generously supported.

Canada, until very recently, has been an interested spectator of the movements for increased industrial efficiency, no technical training being supplied to apprentices and industrial workers generally, the time has now arrived when we must take a step forward in this direction. We have enough raw materials, and to spare, for all that is needed in our industries, and with the required training for our young men, we will tell an industrial and economic story never told before.

Let us teach our apprentices that honorable dealing is the foundation of a successful career, in that lies the security of vast properties, and that the safety of communities depends upon their skill, accuracy and honesty. There is no room for pessimism here, let us be thankful, and take courage for the future, as they see the influence of technical training, which has transformed the face of the world, and led to increased recognition of the unity of interest. Let us awake

H. Hicks, Toronto, elected provincial vice-president for Ontario.

to the truth of Lowell's words:

"No man is born into the world whose work
Is not born with him. There is always work
And tools to each withal, for those who will,
And blessed are the horny hands of toil."

Geo. Clapperton,
Chairman Apprenticeship Committee.

This ended the morning session and the proceedings were adjourned to take in the trip up the River St. John.

Not only were the members of the association invited to take part in this enjoyable feature but the following representatives of the manufacturers and supply men, too, were on hand. These gentlemen certainly assisted in no small way to make the trip as enjoyable as possible.

James Robertson Co., St. John, was ably represented by Messrs. O'Keefe, O'Neil, Ramsay and Terry.

Dominion Radiator Co., Ltd., Toronto, by A. L. Macdonald, Toronto, who by the way paid great attention to the wants of the inner man.

T. McAvity & Sons, St. John, N.B., was represented by Messrs. Malloy and Colwell. Standard Ideal by Mr. Sayville. P. Campbell represented the Taylor Forbes Co., Guelph. Warden King, Ltd., represented by Charles Webb.

W. H. Fraser, of Wm. Stairs Sons & Morrow, Halifax. Wm. Knight, president of the Amherst Foundry Co., Ltd. Amherst, was on hand.

C. A. Dunham Co., Toronto, represented by R. S. Eagar, Halifax, N.S.

Messrs. Twyfords, Ltd., Hanley, England, was represented by S. Norman Sancton.

Empire Brass Mfg. Co., Ltd., London, had Wm. Darling, late of the Canadian Wolverine Co., on hand to represent them.

Steel & Radiation, Ltd., Standard Sanitary Manufacturing Co., and others were also ably represented.

TRIP UP THE ST. JOHN RIVER.

An orchestra was taken along and supplied music for dancing. Among the guests on the trip were his Worship Mayor Frink, Hon. Judge Ritchie, William Mardock, city engineer, Dr. G. G. Melvin, John Kelly, T. Barnes and M. Howard.

E. Noble, London, elected secretary-treasurer for the Canadian Society of Heating Engineers.

Pleasing parts of the program were the excellent addresses given by Mayor Frink, President E. H. Russell of London, Ont., and Geo. S. Dorman, of Moncton.

His Worship the Mayor welcomed the visiting delegates and expressed himself

A. Charette, Montreal, elected provincial vice-president for Quebec.
He is also president of the Montreal Society of Sanitary and Heating Engineers.

as being sorry that he was unable to be present at the opening meeting to welcome the visitors. He said that he felt it a honor to be asked to speak to such a body of men, who were doing so much towards the upbuilding of this our beautiful Empire. No trade or profession could lay claim to be so important and necessary to humanity as was sanitary engineering. Such work made it possible for people to dwell in large cities, to live in sanitary environments and to build up a robust and healthy people. The local society has shown the city of St. John some very concrete examples of this beneficent and important work by their splendid co-operation with the local board of health. He hoped they would enjoy the noble beauties of the St. John River and concluded with a few remarks on the present great European struggle.

Hon. Judge Ritchie addressed the party in a very enthusiastic manner. He called the attention of his hearers to the great struggle which this Empire of ours is waging. He said: "Gentlemen, you have your business struggles, you have your problems to fight about between various departments of your business, and no doubt you will win out. You may differ somewhat amongst yourselves when trying to solve the various problems you are brought up against, but, as a whole, you are united in the great struggle to better conditions, to make our towns and cities healthy and sanitary.

"Gentlemen, you and your labors remind me of the great struggle which our beautiful Isle of Erin was engaged in, when Kaiser Bill came into the limelight. He thought it was a disrupted Empire he had to fight. He thought we were caught napping.

"But, gentlemen, this struggle is not being waged in a disjointed manner, but by a united whole. Not by Orangemen, Home Rulers, Liberals, Tories, French-Canadians, Hindoos, Irishmen nor Scotsmen, but by British gentlemen, united Britons. And you, gentlemen, when you are fighting for good laws to govern sanitation and sanitary installations, are a united whole. The Empire is fighting for freedom from militarism and despotism; you as sanitary and heating engineers are fighting for freedom from filth and insanitary surroundings. You will win, and so will the Empire, and I wish you God-speed in your good work."

Addresses were also given by the retiring president and the newly elected president, and Mr. Dorman hoped that the same co-operation and support which had been given to him by the members would be extended to his successor. He also thanked the members of the St. John local for the excellent program of entertainment which they had provided for the visiting delegates.

The newly-elected president, E. H. Russell, thanked the members for the honor conferred on him and said a few words about the legislative powers of the association. He trusted that the coming year would prove one of great success for the members individually and as a whole.

Dancing, and other social pleasantries was indulged in during the rest of the

G. F. Frankland, Ontario delegate to the 20th annual convention.

voyage and a bountiful supply of refreshments were partaken of by all.

The trip up the river was thoroughly enjoyed by one and all, the scenery on the St. John river will never be forgotten by those from far-off districts. If the weather had been a little more congenial it would have added considerably to the enjoyment of the party, but somehow the weather man did not seem to favor the convention, it being wet weather all the time. The boat returned home by about 8.30 p.m., which brought Wednesday's proceedings to a close.

THURSDAY MORNING SESSION.

Thursday morning found every member and delegate in his place ready to give the convention a successful close.

A number of the delegates took up questions of importance, under headings of sanitary, heating and ventilation, apprenticeship, proper inspection and inspectors, as well as the necessity of having a member of the craft on all boards of health throughout the Dominion.

At this juncture E. H. Russell made a late appearance. He having been delayed on account of some one purloining his wearing apparael. However, after the merriment thus caused had subsided, Mr. Russell addressed the meeting, and took up the question under discussion, viz., sanitary engineering. He pointed out that sanitary engineering was no longer a mere trade, that it was a profession, and should be conducted upon dignified lines. No man could make a success of this profession if he was not heartily in sympathy with all works of a sanitary nature. Not only does it require men who love the profession, but also good business men, men who could hold up their heads honorably before the whole community.

He pointed out that no class of men were to-day so indispensable as the sanitary and heating engineer, thus proving that it required men who were sincere, and in the profession for more than mere dollars and cents.

D. J. Shea spoke a few words in reference to those who at one time kept a showroom of their own, but who since the war broke out had dispensed with it in an effort to cut down expenses.

He could cite several who were sorry they had taken such a step, and pointed out that very few business men, manufacturers and supply houses had cut down on their advertising, simply because it would be poor policy on their part. Said he: "If you desire to sell more goods you must display them. You must endeavor to make your showrooms more attractive so as to draw trade." He was spending more in advertising today than in rosier times, all with a view of keeping his business before the public.

Several members spoke of having invested in a show room and found that they were receiving a benefit by so doing. Money invested in an attractive showroom is far more profitable than money hoarded in the bank at such times as we are now passing through, when such money would only bring a matter of 3 per cent. interest. Surely a nicely laid out show-room would bring better returns than 3 per cent., and would assist materially in keeping some of our manufacturers' factories busy, thus giving a lot of work to those engaged in these factories.

G. F. Frankland spoke a few words on the question of heating, and referred to the likelihood of a heating by-law being brought into operation in Toronto.

He related a few facts about the new examination board of sanitary engineers, stating that all journeymen as well as employers who engaged in the installation of plumbing would require to be licensed, and before they could procure a license they would have to pass an examination.

John McKinley, Ottawa, asked Mr. Frankland if they still allowed the installing of clay tile pipe within the walls of a building. Mr. Frankland replied that he regretted very much to have to admit that it was optional, either clay tile or cast iron pipe could still be used within the walls of a building. Mr. Frankland charged Edwin Newsome, the editor of The Sanitary Engineer, Toronto, with reminding Mr. McKinley about the matter. This caused a little merriment, as very few cities in Canada allow tile pipes within the walls of the buildings at this date. Mr. Newsome was in this particular case innocent of the charge, but said that it would ever be his aim to remind the trade of all

Waiting for the good ship Champlain to make a start. Guess who's behind the gamp. Everybody knows them.

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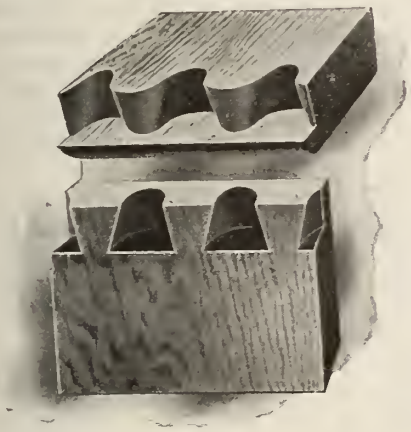

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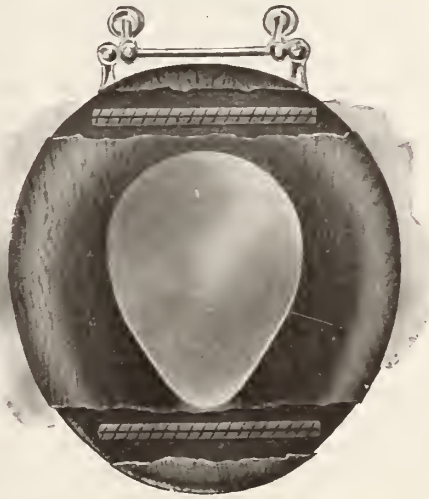

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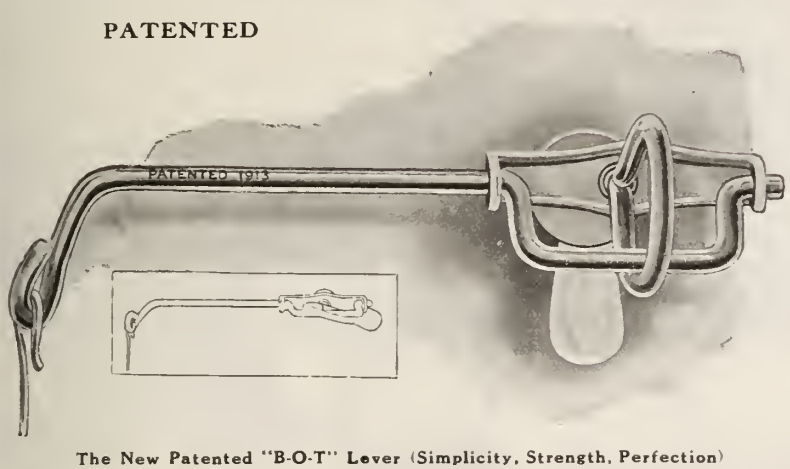

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such evils. Mr. McKinley went on to say that in the interests of the trade it was most desirable to have practical plumbing inspectors. In Ottawa they had practical men who also took an interest in the licensing question, for instance a man applied for a license, and he would be asked a few questions. But after the license was granted the inspectors would watch all the work done, and if it was found that the holder of the license could not execute his work in a proper manner, that man would not be allowed to procure another license. The board of health too, have power to cancel a license if the inspector recommended its cancellation.

John Watson, Montreal, spoke a few words along this line. He said they had a practical chief plumbing inspector, who did the square thing all round.

Every person applying for a license in Montreal had to go before a board of examiners and prove their fitness.

F. W. Noble, St. John, N.B., stated that the worst evil they had to contend with in this connection was that a cabinet maker was given the position of plumbing inspector, and while personally there could be no fault found with their inspector as a man, it certainly was very illogical to expect a cabinet maker to know how plumbing should be installed.

The public were paying the piper every time owing to inferior work being foisted upon them.

The local society of St. John had the sympathy of every practical man, which was proved by the way members throughout the Dominion expressed themselves.

W. H. Thorne, of Sussex, N.B., said that the question of practical men as inspectors seemed to be dealt with in too slipshod a manner. If it was so very necessary for a man to be practical and to pass a severe examination, he could not see why an inspector could be any old thing with a little pull. The inspector is, as it were, the captain of the ship, and no one would think of setting sail on a ship with an inexperienced captain. Yet there were quite a large number of cities in Canada doing just that very thing.

In many towns and cities a person would be an apprentice, or rather helper one day, the next he would be a journeyman, and a day or two after he would be a boss plumber. Particularly was this kind of thing likely to occur where a cabinet maker and blacksmith was acting in the capacity of plumbing inspector.

Such conditions were to blame for having so many poor business men in the trade to-day.

He cited a certain installation where there was not a wiped joint on the job, but where connections between lead waste pipes and ferrules or solder nipples were simple cupped or overcast joints.

Other matters of a general nature were taken up by various members present.

John A. Gordon, Montreal, took the floor and moved a vote of thanks to Mr. Newsome the editor of The Sanitary Engineer for the able way in which the interest of the trade was being voiced in that journal. John McKinley, Ottawa, seconded the motion, which was carried unanimously.

E. H. Russell, the president, in extending the vote of thanks to Mr. Newsome, stated that the trade were indebted to The Sanitary Engineer in no small degree for the valuable assistance the paper was giving them. He could not express in mere words the feeling he had for that publication. He said, "I know you and your paper are fighting a good fight. It has the whole Canadian trade behind it, and certainly is endorsed by every member of the association from coast to coast. The work you are doing is one worthy of the highest praise, and the work which I know you have planned to do is bound to be of inestimable value to every member engaged in the profession. With these few words I will conclude in extending a hearty vote of thanks to you Mr. Newsome, as editor of The Sanitary Engineer, for the excellent co-operation and kindly attitude of your paper." A fitting reply was made by Mr. Newsome.

Mr. John Eggett, London, moved a vote of thanks to the local society for the able way in which they had catered to the visiting delegates. This was seconded by John Watson, of Montreal.

W. J. Crawford, St. John, N.B., replied in a very fitting manner. He wished the members present to know that all

(Continued on page 37.)

Snapshots taken on the River St. John, one of the most enjoyable features of the convention.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 7.

BACTERIA, yeasts and moulds in varying quantities are nearly always present in the air. They are not found, however, at the tops of mountains or over deserts, and the number over the ocean decreases as the distance from land increases. The air is never at a standstill; storms and waves keep it in motion. Change of season, human habitations and other causes also combine to keep it from a state of rest. Dust particles are consequently carried around by the air as are also salt crystals from the ocean spray. One dust particle or salt crystal has been found to be able to carry three bacteria. Ordinarily, however, there may be only one bacterium for a very great number of dust particles. In a cubic metre of air taken from over the ocean there was found only one bacterium. In the same amount of air taken from a Paris hospital there were 79,000 bacteria.

Diphtheria, influenza, pneumonia and tuberculosis are diseases that may be caused by bacteria present in the air. Whooping-cough and measles are possibly others; and the splashing of infected water may cause typhoid and cholera. In many contagious diseases bacteria may be expired or sneezed into the air by the patient.

Ordinarily the air breathed out or expired is free from bacteria, therefore any bacteria breathed in are generally retained in the mouth, nose or throat. However, most of them are harmless. Drying and direct sunlight are two important factors that combine to cause the death of bacteria in the air. In the open air of the country there are many less than in the city air. Also there are fewer outdoors than indoors, especially of the pathogenic bacteria. This is one important reason why outdoor life in the country is so healthy, the danger from infectious diseases being very slight.

The air is composed of several gases that are thoroughly mixed, but are not chemically combined in any way. The principal gases are nitrogen, oxygen, water vapor and carbon dioxide. There are several other inert gases like argon also present in small quantities, but they may be considered as similar in their properties to nitrogen. There may also be traces of sulphur dioxide, ozone, hydrogen, ammonia and nitric acid. The amounts of these latter gases are influenced by factories in the cities and by electrical discharges in the air.

Ordinarily water vapor and carbon dioxide make up less than 2% of the volume of the air, which is mainly composed of nitrogen and oxygen in the approximate percentages of 79 nitrogen to 21 oxygen by volume and 77 nitrogen to 23 oxygen by weight. The weight and density of these two gases is so nearly equal that it is almost impossible to separate them by any mechanical means. Chemically, of course, their properties are very different.

Oxygen is needed by all animals in

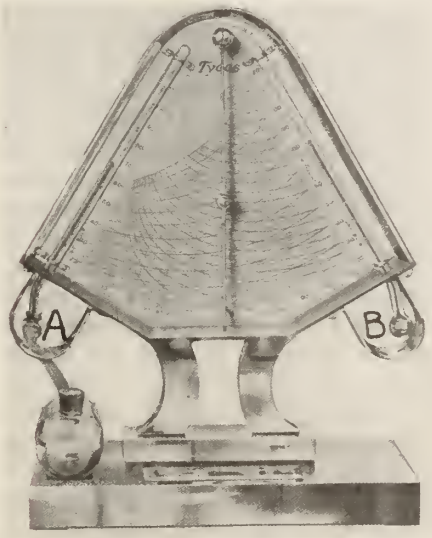


Fig. 14.

breathing and though the nitrogen accompanies it into the lungs it does not aid in the chemical action that takes place. It merely dilutes the oxygen, which if taken alone would be too strong. While taking no part in the respiration of animals, some plants like beans, peas and clover can change the nitrogen of the air into substances that can be used by plants in their growth. This change is accomplished by bacteria that form nodules on the roots of such plants.

Although carbon dioxide and water vapor are present in the air in very small quantities, they play a very important part. It is the carbon dioxide in the air that is the source of carbon for plant life. It occupies ordinarily only a volume of from .03 per cent. to .04 per cent. or 3 to 4 parts in 10,000. If this amount is increased to 10 parts in 10,000 it is supposed to render the air unfit for respiration by human beings. The amount of water vapor in the air is dependent on the temperature and the proximity to a body of water and determines what is known as the humidity of the air. Excessive moisture or lack of moisture may both cause us inconvenience.

An analysis of air that is not affected by factories or other artificial conditions is given in Kahlenberg and Hart's Chemistry by volume as follows:

Nitrogen	77.42%
Oxygen	20.77%
Gases of Argon group	.93%
Water Vapor	.85%
Carbon Dioxide	.03%

An ordinary person breathes from eighteen to twenty times per minute and inhales about 30 cubic inches of air at each breath. About 170 cubic inches generally remains in the lungs. In the expired air, which is saturated with water vapor, there is a small increase in the percentage of nitrogen, but a reduction of oxygen from 21 per cent. to 16 per cent., while carbon dioxide is increased to 4.4 per cent. About one-quarter of the available oxygen taken at each breath is, therefore, used up. In an hour each adult person exhales about seven-tenths of a cubic foot of carbon dioxide. This carbon dioxide is being formed continuously in the lungs and body and expired at each breath. The carbon derived from the food eaten unites with oxygen—just like the combustion in a furnace, only not so intense. The body is kept by this constant combustion at a temperature of 98 degs. Fahrenheit.

A person might breathe air, otherwise pure, in which there was present 2 per cent. of carbon dioxide, but when present, in a room occupied by people, to .10 per cent. it is considered unhealthy, for the reason that the accompanying moisture and possible unpleasant odors that may be given off by the lungs and the pores of the body make a room "stuffy." Some writers claim that air passed through the lungs contains a special poison. This is denied by

other investigators, who find no poisons from healthy lungs. They claim that it is only the excess of carbon dioxide and the corresponding depletion in the amount of oxygen that is harmful. Disease organisms may also be present and for the various reasons stated most authorities claim that as carbon dioxide is a measure of the impurities in the air, that there should not be more than .10 per cent. present in a room and that .18 per cent. is very bad. The amount of carbon dioxide given off by adults is naturally more than that given off by children. When asleep the amount given off is less than when awake and violent exercise greatly increases the amount of carbon dioxide expired.

Carbon monoxide in even small amounts should be strictly guarded against. The blood takes it up instead of oxygen and becomes incapable of performing its function. Carbon monoxide is a product of incomplete combustion in stoves or furnaces. It is present in coal gas to 13 per cent. and in water gas to 39 per cent. A leaking gas pipe may therefore prove fatal.

TABLE IV.

Amount of air in cubic centimeters needed	Amount of carbon dioxide in parts per 10,000
46	18—Very bad
58	14
69	12
82	10
91	9—Bad
103	8
117	7
138	6
165	5—Good
207	4

Some gases are not poisonous, but we are unable to breathe them, while others are poisonous:

Irrespirable Gases:

Sulphur
Chlorine
Hydrochloric Acid
Nitric Acid

Poisonous Gases:

Carbon Monoxide
Chloroform
Alcohol
Turpentine
Gasoline
Carbon Dioxide (if in large quantities)

Since the amount of carbon dioxide is a measure of the impurity of the air it is often necessary to measure the amount. Different methods are used, some of them depending on the fact that if carbon is added to lime water the clear solution becomes milky. The chemical reaction is as follows:

$$Ca(OH)_2 + CO_2 = CaCO_3 + H_2O$$

The calcium carbonate is insoluble and the fine particles formed consequently produce a milky appearance in the lime-water. Other chemicals that may be used are caustic soda and barium hydroxide.

Fig. 13 shows one form of a simple apparatus for one of the so-called "popular methods" for determining the amount of carbon dioxide. The results obtained are not so accurate as those obtained by standard methods, but the apparatus can be easily handled and carried around and with care should give fairly good results. The glass shaker has an inner tube that can be drawn out and measured amounts of air added. A certain amount of lime-water colored with phenolphthalein solution is placed in the bottom of the outer tube and the amount of air necessary to decolorize it is noted. The greater the amount of carbon dioxide in the air, the less is the amount of air required to accomplish the decoloration. The relation between the amount of air used and the amount of carbon dioxide present is given in Table 4.

The same method is used with the Wolpert shaker which, however, has a plunger with a hollow piston instead of an inner tube.

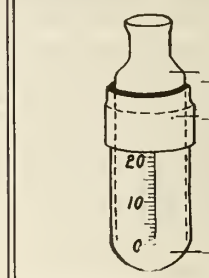
Water vapor or atmospheric steam is a very variable constituent of the air. It is produced by the evaporation of water and the amount present in the air is therefore influenced by the proximity of bodies of water. Also the capacity of air for moisture in the form of vapor varies with the temperature. At 0 deg. C. air can hold about five grams of vapor per cubic metre of air and at 30 degs. C. about 30 grams per cubic metre or six times as much. When the air contains all the vapor it can possibly hold it is said to be saturated.

When warm air containing water vapor is cooled there is a temperature at which the vapor will begin to condense and form water. This temperature is termed the dew point. Rain, dew and frost are all caused by air being sufficiently cooled to cause it to give up some of its water vapor.

The ratio between the quantity of vapor actually present in the air and the quantity it is capable of holding when saturated is known at the humidity of the air and is expressed as a percentage. It is not the actual amount but the relative amount of moisture at any temperature that is important.

Since the human body is constanly giving off moisture from the skin and lungs, the relative amount of moisture in the air, or the humidity, is readily noticeable. In the summer at 90 degs. F. the air may feel fresh and invigorating if the humidity is below 50 per cent., but when the air becomes nearly saturated or from 90 to 95 degs. humidity then the air becomes oppressive and exhausting. Ordinarily we lose by evaporation two pints of water per day, and lose heat by radiation. If the atmosphere is very humid there is no evaporation to cool us and if the temperature is also high we can get rid of our bodily heat neither by evaporation of radiation. In the winter at low temperatures excessive humidity makes the air chilly and the cold penetrating.

It is generally stated that air should contain a relative humidity of 60 per cent. for comfort in the home. At 35 per cent. the mucous membrane of the nose and throat becomes dry and easily irritated. The humidity of the desert is as low as 30 per cent., and adds to the discomfort of the traveler. But in our own country in the average home heated by steam or hot water to 70 degs. F., the statement has been made that a humidity of only 28 per cent. is often experienced and with hot air furnace heating as low as 24%. Apart from the discomfort and the trouble to health this may cause there is the fact that dry air needs to be from 8 to 10 degs. higher in temperature to feel as warm as air with a relative humidity of 60 to 70%. This means that by not making adequate provision for sufficient humidity at a trifling expense, the coal bill may be greatly increased.



Dr. G. W. Fitz shaker for determining the amount of CO_2 in the air.

Fig. 13.

Instruments for measuring humidity are known as hygrometers. Fig. 14 represents an hygrometer called the "Hygrodeik." A silk wick from a glass of cistern water keeps the bulb of thermometer A wet. If the air is not saturated, thermometer A will therefore, on account of the evaporation, register a lower temperature than thermometer B. The relation between the two temperatures indicates the relative humidity, which can be found by means of the chart located between the thermometers.

(Continued in next issue.)

Practical Course for Sheet Metal Workers

ARTICLE No. 17 OF SERIES

By CHARLES SEIVERS

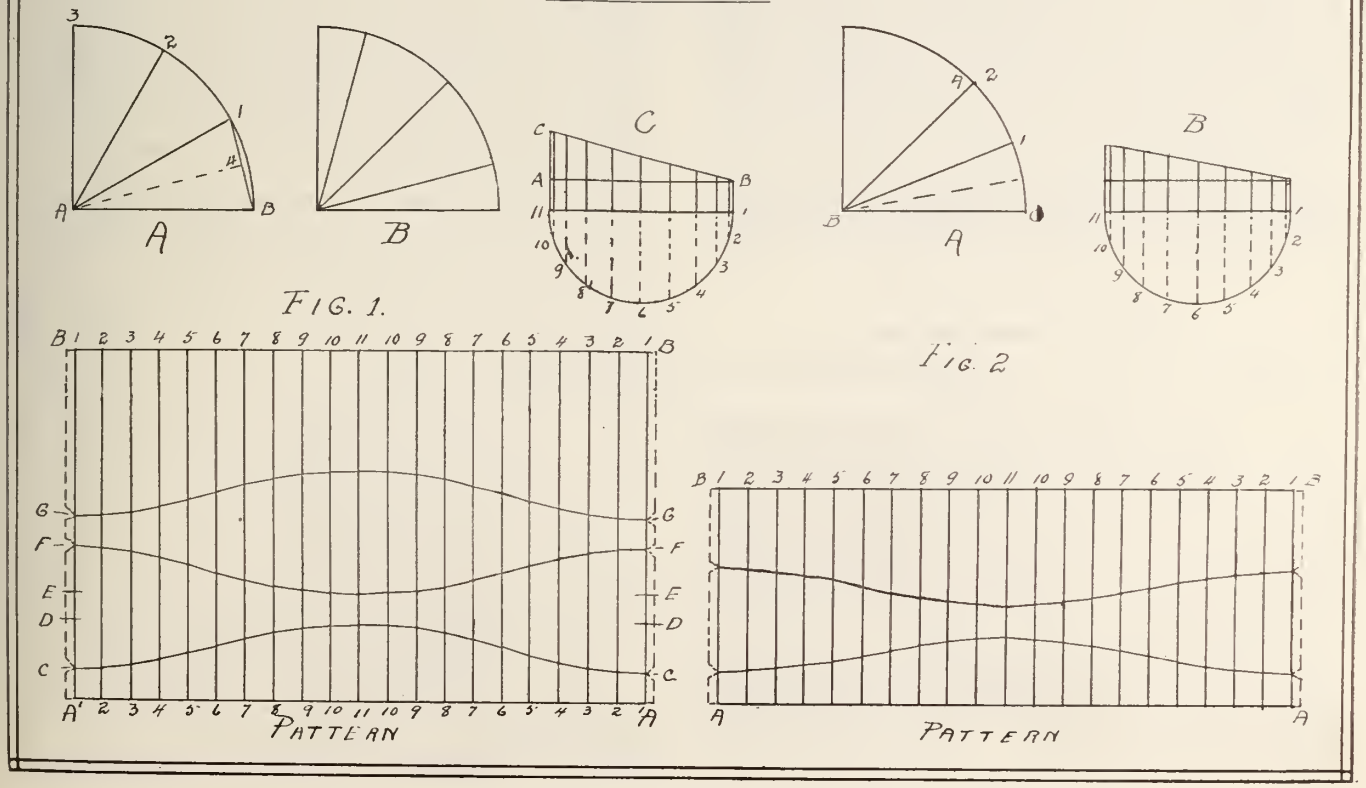
IN this we will endeavor to explain how we cut a more than two-piece elbow pattern in round pipe. Having decided how many pieces the elbow is to be made, the first step is to find the amount of rise to give each section of the elbow. To find this, draw a quarter circle, with a radius equal to the diameter of the elbow required, as shown by A-B at A in Fig. 1. With dividers or compasses divide the quarter circle in two equal parts, one part less than the number of pieces required in elbow, so that for instance for a four-piece one, divide into three equal parts, as shown by 1, 2, 3 at A in Fig. 1. Divide one of these divisions into halves, one of which will be the raise required, as shown by B-1-4 at A.

At B is shown the sections as divided, laid out in a similar manner to an elbow.

In ordinary practice it is only needed to develop one-piece of the elbow. At C is laid out A-B equal to the diameter required, and at right-angles to A-B at A is A-C equal to one raise of the elbow as shown by B-4 at A. On the line A-B draw a half-circle, divide the half-circle into a number of equal parts as shown by the figures 1 to 11. From each of these points draw lines at right-angles to A-B extending them until they join the line C-B. The next step is to outline the pattern. Draw two parallel lines as shown at A-A and B-B. At one end draw a line at right-angles to A-A to B-B. From this point set off on A-A and B-B the divisions on the half-circle, from 1 to 11, and repeat in order to make the circumference complete. Next draw lines joining 1 to 1, and 2 to 2, etc. With compasses or dividers, measure the distance from the line 11-1, to the line C-B, commencing at point 1, and set off from A-A on lines numbered 1, measure off space 2, and set off on lines two, measure off space 3, and set off on lines numbered 3, and so on until the space numbered 11 is reached, when it can only be marked off once, it being the centre of pattern. Now draw a line through the points just obtained on pattern, which will give outline of one end piece. To mark out balance of elbow, one line 1-1 on each end mark off, first the amount of raise, as from A-C shown at C, then the desired width of each piece of elbow in the throat, and then the raise A-C, as shown, by D-E and F at each end. Cutting out the portion of pattern just finished, turn it over on to the upper part of layout, keeping the points C-C even with the points F-F when even scribe off with scratch awl or pencil To obtain the next piece, on lines 1-1 mark off the width of each piece at the throat as between D and E, as shown by G-G. Using the first portion of pattern obtained, next place the points C-C over the points G-G and when even scribe around. The balance of the layout or piece will form fourth piece of pattern. The dotted lines show the allowance for locks on each end, (no allowance is shown for small end), the notches on the locks are to allow machines turn edges.

In Fig. 2 we have an agle elbow in three pieces. At A is shown the angle A-B-C, which is divided in the same manner as described for a square or 90 degree elbow. At B is shown the raise laid out to obtain the height at the different points, and below is shown the pattern developed all the different steps being the same as described in Fig. 1.

PLATE 17



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JULY 1st, 1915

Convention Week

LAST week was convention week. The Canadian Society of Domestic, Sanitary and Heating Engineers held their twentieth convention in St. John, N.B.

It proved to be one of the most successful in the history of the society. Some of the charter members turned out, and expressed their great satisfaction at the way the various phases of the business were conducted.

Not one member present went away with the least misgiving as to the outcome of the work accomplished. Last year, as you all know, there did occur some little "rift in the lute," but this year everything was in tune. It was a most harmonious event, both as regards business and pleasure.

The entertainments prepared were fully appreciated by every one present. The trip up the beautiful River St. John being the best of all. It is an old saying that no prophet was ever appreciated in his own country, and certainly the people of New Brunswick could not possibly have realized how the beautiful scenery of the St. John river was appreciated by the visitors from all over Canada who were in attendance at this convention.

The delegates from London gave a pressing invitation to the members of the Society to choose London, Ontario, for the twenty-first convention, and the invitation was accepted unanimously.

Faulty Installations

ONE of the greatest evils in the trade to-day is that of faulty installations.

Several men submit a tender for a certain job, only one can get it. In many cases one of two things occurs, either a cut-rate price, with all its inferior quality of goods, and the employing of impractical men secures the job, which when completed is not in accordance with the plumbing by-laws of the district, or, it is a case of squaring the architect in some way.

The installation of plumbing not in accordance with the by-laws can, of course, only happen where an impractical man is filling the position of plumbing inspector. The public are paying the piper every time.

Now, if any of our readers have a grievance of such a nature as has been mentioned, *The Sanitary Engineer* will only be too pleased to help fight against such conditions. If our readers will furnish us with sketches of the faulty job and a set of their local plumbing by-laws, we will take the matter up and draw to it the attention of those responsible for the carrying out of the by-law. We will publish a plan of the bad installation and point out where lies the fault, as well as reproduce drawings showing what the by-law in existence does require, and then see to it that copies of the paper get into the hands of those to whose attention these matters should be brought.

Imagination in Business

IMAGINATION is the power of building mental pictures of conditions that do not exist. A too prolific imagination may produce a dreamer of dreams that never come true, or an over-developed imagination has, under certain conditions, produced some of the great prevaricators of history. However, I think a well-developed imagination is a prime requisite for any successful business man, and a great many more men suffer from lack of it than from an imagination over-developed.

Most business men are too closely engrossed with the work immediately at hand to dream dreams of the future; too busily engaged in details to take a day off and stand back and look at themselves or their business to see it as others see it. Your business is going one of two ways, it is either going backward or going forward. If going backward, why? This calls for imagination, to say where you would have been had you done things differently. If your business is going ahead, again we ask, why? Is it the result of a plan carefully worked out, with a distinct goal in your imagination, or is it just luck?

The man who succeeds in the long run and whose success is no accident, is the man who, in his imagination, has chartered his course long before. He is the man who make plans. I do not care whether he be a vendor of peanuts or a builder of locomotives.

When J. J. Hill traversed the continent on horseback, he saw, in his imagination, fertile fields being tilled, cities built, mines giving up their wealth, all contributing their quota of freight to make a success

of his business—railroading. In his imagination all those things existed years before they became realities. In his master-mind I have no doubt that there now exist images, real in his imagination, towards which he is building but whose fruition may be decades in becoming realities.

This beautiful Dominion of ours has no use for the man who says he does not like his business and whose sole motive is to make a living for himself and family. He lacks imagination of the possibilities of his business with the result that, hating his business, his business hates him and gives him only an indifferent living, the least that can be given him and keep the men at work. Such a man is a parasite whoever he may be.

True Patriotism

DURING the last few weeks the writer in visiting several towns and cities in the Maritime provinces and the province of Quebec was agreeably surprised to note the general business activity, and optimistic spirit which is to be seen in every direction. The business men in all lines are doing fairly well, there is not one iota of pessimism apparent. Speaking to one of the largest jobbers in one of the provinces named about business conditions he said,

"Well there are only two ways in which a British subject can put into practice true patriotism one is by joining the armed fighting forces at the firing line, and the other by keeping his business in a healthy state. If he be a jobber or manufacturer he should advertise, keep up salaries, create more activity amongst his selling force, and in every sense, keep at it. He should strain every nerve to create a greater circulation of the country's wealth as well as goods, because you know if merchandise of any kind is not kept moving it is a direct liability. If on the other hand it is kept moving, being manufactured and disposed of, then it is a valuable asset.

If the man is selling his labor power, he can be just as truly patriotic by trying to put out a little more labor for his salary. Whether he be receiving more money or not is not the question, labor is inherent capital, it is more valuable than gold, and if not put out to the very best advantage in times like these, results in the country are so much the poorer. The industrial worker should put just the same spirit into his work as the hero in the ranks at the firing line. By so doing he becomes an inestimable asset to his country. There's my view of true patriotism. We in this province have no room for the pessimist."

The Sanitary Engineer just feels the same.

True patriotism cannot be valued in dollars and cents, cannot be bought with mere money. As our worthy friend whom we have just quoted says, we should all put our whole spirit into our business, we should call upon every prospective customer and sell him of our goods and labor thus assisting in keeping our foundries and workshops busy and creating a more active distribution of both money and merchandise. The sanitary engineer who sits in his shop bemoaning his lot is a poor sample of physical anatomy. He should get out after business, and of a surety if he seeks, he will find.

Get a Signature

A VERY interesting discussion took place at the convention in connection with procuring signatures upon time cards. When an account is presented by a sanitary engineer to his customer there is oftener than not some remark or complaint made regarding the time which is charged on the bill. Exceptions are taken to the sanitary engineer charging the walking time to and from the shop.

Now, this is simply a matter of education, and should be given some explanation. It is a very simple matter to explain to each man how he should meet such complaints. For instance, the journeyman should be told to explain to the customer that his time sheet is stamped or marked by either the timekeeper or employer showing the time he, the journeyman, left the shop, and if the customer objects tell him or her to mark the time sheet to that effect and sign it, that is, sign the protest.

However, we feel that every time card or sheet, should be stamped or marked, showing the time at which a man left the shop. It should be handed to the customer upon reaching the job, and upon leaving the job the journeyman should procure its return duly signed, the time to be marked upon it should give allowance for walking time, this latter time should be verified by the timekeeper or employer. This method is the greatest protection any sanitary and heating engineer can give to his customers, and, as we asserted before, it is simply a matter upon which the customer should be enlightened.

With Apologies to Hamlet.

To cut or not to cut that is the question,
Whether 'tis better in the end
To let the chap who knoweth not his business,
Sell his goods at cut-throat prices, or,
Take up arms against his competition
And, by cutting, cut for cut, end it—
To cut—and thus by cutting put the other cutter
Out of business—'tis a consummation
Devoutly to be wished. To cut—to slash—
Perchance myself to get it in the neck—
Aye there's the rub; for when one starts
To beat the other fellow's prices, 'tis like as not
He'll find he's up against it hard.
To cut and slash is not to end confusion
Nor cure the many evils that industry is pestered with;
Nay, nay, Pauline: 'tis but the fore-runner
Of debt and mortgage that such a course portends.
'Tis well to get the price that goods are worth
And also take the joy and profit
Found in a friendly unity of action,
Instead of wasting all the meat of gain
In unhappy and vindictive opposition.
Price cutting doth appear unseemly,
And fit only for the man who knows not costs
Nor what his finished goods are worth, and who, ere long
By very stress of making vain comparison
'Twixt bank account and liabilities
Will from the futile struggle make his exit.

J. A. GABEL.

A New Gospel of Salesmanship

The Elements that Enter Into the Science of Business Getting

AT a recent convention of the sales organization of The Steel Co. of Canada, Ltd., of Hamilton, an address was given on the fundamentals of salesmanship by the sales manager of the company, George A. Simpson. This address is printed herewith as it presents a new gospel of salesmanship in a most striking and forceful manner. Mr. Simpson's terse and epigrammatic exposition is well worth close attention and study; for it gives a new viewpoint and supplies the inspiration for a closer grip of the problems of the salesman, and a more abiding enthusiasm.

GEORGE A. SIMPSON.

Gentlemen:—

At our last Convention, held in Montreal, I had the pleasure of talking to you on the subject of salesmanship. During the course of my remarks then, I made this statement: "There is no mystery in salesmanship that any intelligent man cannot master if his nature is in harmony with the principles of trade, providing he is blest with good health, a fair amount of common sense, a determination to succeed, and has a full measure of truth and honesty in his make up."

Well gentlemen, the older I get, and the more experienced I become, the more convinced I am of this statement. Salesmanship is not a mystery, it is a science. And it is a science that can be learned and mastered, just as any other profession can.

There are certain fundamental principles that must be studied and understood. There are certain laws that must be obeyed, and certain conditions that must be respected.

These conditions, principles and laws, do not pertain to the impossible or the mysterious, neither are they beyond the reach of the man who is sincere and who is determined to succeed; but they must be taken into account, and reckoned with before we can lay claim to being successful salesmen.

I maintain that the real salesman is the man who is continually sowing seeds that will ripen into profits on future sales—the man who is building up through his study of things as they are, through his personality, honesty and fair dealing, a following who believe in him and respect him; one who is forging a chain of satisfied customers over the entire territory he covers, and thereby creating an influence that not only means other sales, but more links to his chain. Such a man is an asset to the interests he represents, and his services will always be in demand.

Salesmanship is that power resulting from a combination of certain qualities and faculties, mental, spiritual and physical, which enables him who possesses it to successfully influence a high average of those he interviews to purchase, *at a profit*, mark you, that which he has to sell.

I will touch briefly on some of the essential qualifications that are, in my judgment, necessary for the salesman to understand. Take for instance:

The Science of Thought.

Thought is supreme. It is not, as is often supposed, a mere indefinite abstraction or something of a like nature. It is, on the contrary, a vital force, the most vital and irresistible force there is in the Universe.

In our Laboratory experiments, we are demonstrating the great fact that thoughts are forces. They have form and quality and substance and power and, furthermore, we are finding out that there is what we can call "Science of Thought."

Through the operation of our thought forces, we have creative power. The spoken word is nothing more or less than the outward expression of the workings of these interior forces.

The spoken word is in a sense the means whereby the thought forces are focused and directed along any particular line.

This is concentration of thought and there is no question in my mind that if we concentrate and then apply the expression of that thought in well spoken words, we will accomplish our purpose. Neither is there any question in my mind that, if a salesman goes after his prospect with a determination to get the order, and then concentrates his thought on his prospect, and the end he wishes to accomplish, he will, if he expresses himself right, land the order.

Thoughts are forces—"Like builds like, and like attracts like."

If we govern our thinking, we determine our life.

The law of attraction between mental and material things is wonderfully exact in its workings. People ruled by the mood of gloom, attract to them gloomy things. People always discouraged and despondent do not succeed in anything, unless it is in making other people unhappy. They live only by burdening others.

The hopeful, confident and cheerful attract the elements of success, and they become a power and an influence for good in any community. In a salesman a disposition of this kind is invaluable, and if steadily practised, would make him the despair of his competitors, and establish as a shining example a well balanced and successful salesman.

This may be new sales gospel, but it has proven to the satisfaction of all real students of business that the most successful man is he who is sure of himself. He who is optimistic and cheerful impresses the world with the fact that he is supremely confident always; and the world of business has every confidence in the man who has confidence

in himself. If our outlook is optimistic, and our confidence strong, it naturally follows that we inject enthusiasm and clear judgment into our work, and therefore we have a tremendous advantage over those who are inclined to be pessimistic and nervously fearful that their judgment may be wrong, those who lack confidence that comes with a right condition of mind, which counts so much for success in a salesman's career.

In our mental lives we can either keep hold of the rudder and steer the course to success, or we can fail to do this, and drift on to the rocks of failure.

There is in connection with the thought forces, what we may term the drawing power of mind, and the great operating law in this connection is identical with that great law of the universe, that "Like attracts like." We are continually attracting to us forces and conditions most akin to those of our own thoughts.

The Law of Attraction.

The law of attraction works universally on every plane of action, especially in the field of sales, because no-one will buy from a man he does not like, unless he has to. Therefore, it is necessary and essential that every salesman study the Law of attraction.

If we desire one thing, and expect another, we are like a house divided against itself—bound to fall.

We must first determine resolutely to expect only what we desire; we will then attract only what we wish for.

Carry any kind of thought about you, and as long as you retain it, you will unceasingly attract to yourself, knowingly or unknowingly, exactly and only what corresponds to your dominant quality of thought.

Thoughts are our private property, and we can regulate them to suit our tastes entirely, by steadily recognizing our ability to do so.

This being so why not study and apply our thoughts to reinforce our power of attraction and to draw closer to us those with whom we do business?

It is possible, and I can assure you it will lessen your work and increase your sales.

If you do not feel kindly towards a buyer, change your mental attitude. In other words, change your thought, and make an effort to attract him towards you, and just as sure as you do, his manner will change, and your orders increase, because the law of attraction is absolute.

And the salesman who is always cheerful, hopeful, confident, courageous, and determined, on his set purpose, will, if he keeps to that purpose, attract to him powers favorable to that purpose.

Honesty and Truth.

Honesty and truth travel hand in hand. They are two very important factors in successful salesmanship, yet there are thousands of so-called salesmen who are daily practising deceit, thinking and believing they are putting it over. What fools! ! I'll grant, "You can fool all the people some of the time, and some of the people all of the time, but you cannot fool all the people all of the time," and there will always be so great a number that can't be fooled, that success along these lines is impossible.

I'll grant that many an honest man talks in a dishonest way, because he thinks he is meeting the dishonesty of the other fellow. It is easy to make a man honest with you by being honest with him.

We should be exceedingly careful in our statements, and, when the time is right to express ourselves, we should do so in a straightforward and honest manner, being careful at all times to temper our talk with QUALITY not quantity. It is not what a man knows, but what he thinks he knows that makes him indulge in quantity. Some one has said, "A real salesman is one part talk and nine parts judgment, and he should use the nine parts of judgment to tell him when to use the one part talk." Talk is necessary in making sales, but falsehood, dishonesty, and deceit, are not. Temporary success may be gained that way, some sales may be made, but permanent great and lasting success is not built on that sort of foundation.

Sentiment and Tact.

There is sentiment in business, and a whole lot more than we realize; when there is none, I shall quit doing business.

For a salesman I know of no other quality more helpful to his success than sentiment; if he will use sentiment and tact to reach the sentimental side of his prospect.

I do not mean by that, that he start an investigation or search for sentiment; for if he did that would be calculation and, even if he discovered it he could not make use of it, as sentiment must be discovered by sentiment to be of mutual advantage in preparing common ground.

I have had scores of instances in my experience that have proven beyond doubt the truth of my contention.

Loyalty.

Someone has said, "An ounce of loyalty is worth a pound of cleverness." I say it is worth a ton, because loyalty is the spirit akin to sincerity and enthusiasm; and enthusiasm is the visible manifestation of our inward thoughts. As Emerson says, "Nothing great was ever achieved without enthusiasm." It expresses faith and optimism—Faith in yourself, faith in your employer, faith in the things you sell, and faith in your fellow-men.

Loyalty is a broad-side of force that the enemy cannot stand. It sustains us when the battle is raging, and it cheers us when the victory is complete. It triumphs over obstacles, defeats defeat and laughs at failure.

Finally, salesmanship is the science of selling goods, making sales, and writing the contract between buyer and seller so plain and satisfactory to both parties, that all misunderstanding or explanation is eliminated, to the end that the business relation is mutually profitable to all concerned.

It is not the act of talking about selling goods, or compiling a "Book of Hows," or writing a paper defining how it can be done according to the "Book of Rules," because there is no book of rules that can intelligently govern a man's actions, who is worthy of the title "salesman;" neither is there a "Book of Hows" applicable to the many and varied conditions that a salesman encounters. Furthermore, no one is capable of making a programme for him to follow, because no one knows as well as he does, what he can do best. Every sale and every prospect is different, and must be handled accordingly, and it is the ability to successfully apply the fundamental principles of salesmanship that entitles him to the name of "Salesman."

A man who carries an order book and samples, but whose volume of sales is not sufficiently large to cover his expenses and leave a fair margin of profit on the right side of the ledger for his employer, is no more entitled to the name of "Salesman" than a man who blows a tin whistle is entitled to be called a musician, or a man who goes to sea to be termed a master mariner.

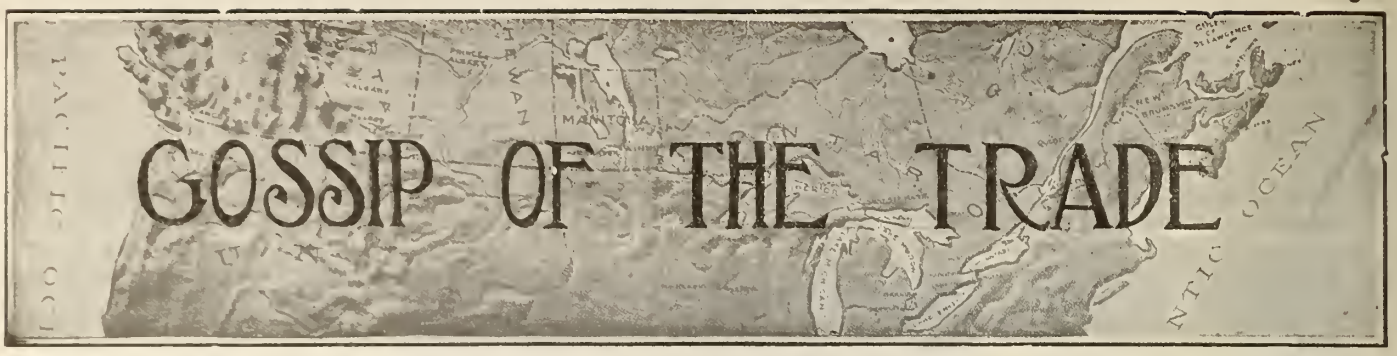
Therefore, it is not "How to do it," that I am bringing to your attention, but "How it can be done." I am not propounding or advocating tricks of trade, but I am defining and recommending the study and application of the accepted and logical science underlying the principles every salesman, worthy of the name, knowingly, or unknowingly applies.

* * *

George A. Simpson was born near Cheltenham, England. He attended school in Cardiff and Pontypool. At the age of thirteen, after the death of his parents in 1881 he went to sea. Returning to Pontypool he went to work in the puddling department of the Pontypool Iron and Tin Plate Company, and later was associated with the Panteg Steel Works in the machine shops and steel casting department. In 1886 he went to Pittsburgh, going direct to the mechanical department of the Sligo Rolling Mills.

During later years Mr. Simpson devoted considerable thought and study to efficiency and organization, and later to advertising and sales promotion.

He was associated for a number of years with the Struthers Furnace Company of Cleveland, as sales agent with headquarters in Pittsburgh, and for years previous to becoming associated with the Steel Company of Canada was connected with the Burger interests of Canton, Ohio, as Special Representative.



DOINGS OF THE ONTARIO SOCIETY.

A Communication.

June 23.

Since the last annual meeting of the Ontario Society of Domestic Sanitary and Heating Engineers on April 23rd, 1915, your directors have been striving to straighten up the affairs of the society to date. Considerable success has been attained in this respect, and the outlook for the future is a great deal more promising than was the case at the time of the annual meeting.

The secretary has visited quite a few of the members in the meanwhile, and, according to reports received on these trips, the general feeling of the members is that the society must continue its work, and in most cases the assurance has been received from the members of their continued support of the society.

Ottawa is deserving of special mention. The members in Ottawa have responded to the visit of the secretary in a most substantial manner, and have promised their continued support.

These trips of the secretary are maybe one of the best things that have been inaugurated, and a continuation of them at regular intervals seems to be the proper thing to do to gain the best results of the society's endeavors.

As regards the proposed Accident Prevention Association in connection with the W. C. Act of Ontario for our section of class 36, schedule 1, of the Act, you all have been notified in the last Bulletin of what action has been taken to date, and after this meeting the matter will be gone further into, when all those in the trade throughout the province will have the opportunity to consider this question as well, they having been notified to attend at this time.

Echo from the recent convention in St. John, N.B.

The election of officers for the balance of 1915 will be one of the matters that will require your attention at this time. In connection with this matter, it has been suggested that at all future annual meetings a nominating committee be appointed at the opening of the meeting and that they report first thing after luncheon on that same day, when the election of officers for the year take place.

J. E. Farrell recommends that the society take up the matter of freight losses as sustained by the members with the R. R. Co.'s for adjustment on this question. The directors would like to have some opinions voiced by the members.

New Officers Elected.

President—E. H. Russell, London.

Vice-President—J. R. Haslett, London.

Treasurer—A. E. Gibbons, London.

Corresponding Secretary — G. F. Frankland, Toronto.

Auditors.

Geo. Ross, Brockville; Geo. Clapperton, Toronto; F. Smith, Guelph.

Examination Board.

Messrs. Russell, Haslett and Gibbons, London.

Chairmen of Committees.

Sanitary—R. J. Sturgeon, Peterboro.

Heating—B. Noble, London.

Arbitration—H. S. Brown, Brockville.

Legislation—Angus McDonald, Stratford.

Apprenticeship—A. Tipper, Brantford.

Educational—W. Brittian, Hamilton.

Trustees of Endowment Fund.

H. Mahoney, Guelph, and E. H. Russell, London.

It will be seen from the above report that the Ontario Society were never in better shape than at present. The old saying: "Every cloud has its silver lining," was certainly true this year, with both the Ontario Society and the Canadian body. Never in the history of the trade have things looked so bright all round. Sanitary and heating engineers are studying better business methods.

E. [illegible] Toronto, elected chairman of [illegible] for Ontario Society

H. Mahoney, appointed trustee of the Ontario Society endowment fund.

The riff-raff are being gradually weeded out, because of business disturbances caused by the war and by natural conditions. Had the war never come our way, business would still have been in an unsettled state, and no doubt when the war is over, business will be in a healthier condition.

PROVINCIAL BY-LAWS.

New Brunswick has something to be proud of in that that fair province has a provincial plumbing by-law, which has been doing good service for over four years.

PUBLIC DRINKING FOUNT.

The city fathers of Victoria, B.C., propose to have public drinking fountains erected in the down town section.

WENT FISHING.

A source of much merriment and joking amongst the delegates and friends at the recent National convention at St. John, N.B., was the desire of the London delegation headed by Bro. Russell, "to take the fish by storm." Russell became so interested in the beautiful display of fish and lobster in a store on Union street that he began to question whether it would pay him to buy a fish or go fishing. However, the rain came on and dampened all the fishing enthusiasm completely out. The party of whom Russell was one finally decided to visit the graveyard and study dates on the tombstones.

A STEP IN THE RIGHT DIRECTION.

The licensed sanitary engineers of Toronto are to be congratulated on their new relationship with the Consumers Gas Co. The cordial feeling now existing can only mean increased business to every one concerned. The members of the Toronto executive of the Domestic Sanitary and Heating Engineers, whose deliberations with the representatives of the Consumers' Gas. Co. had this good result, deserve the thanks of every licensed plumber in the city for the diplomatic way in which they helped to bring about this much-to-be-desired-change. We hope that every licensed plumber will endeavor to cement this friendship by his individual co-operation.

MASTER PAINTERS VS. MASTER PLUMBERS.

The motordrome has been the scene of many thrilling events of late, but everything so far staged dwindles into insignificance when compared with the Herculean struggle which took place on Wednesday afternoon, June 23, between baseball teams representing the Master Painters and Master Plumbers of the city. It was a hair-raiser from the word "play ball."

The plumbers were confident of victory. They had sent out private post cards, printed in blood-red letters, inviting their friends to be sure and be on hand to witness the "whitewashing of the painters." They had even gone so far as to have a band stand erected on the ground, no doubt intending to requisition the military massed bands to assist in their jubilation.

The painters on the other hand were very modest in their demeanor, although confidence was perceptibly written in their countenances. Manager Landon had his men well in hand and gave them

J. R. Haslett, London, elected vice-president of Ontario Society Sanitary and Heating Engineers.

a gruelling try-out before the battle was called.

The score is by no means any criterion of the snappy play displayed by both teams. They were equally brilliant in spots and pulled off some lightning plays. Of course, the game had only got properly squared away, when it was apparent that the painters would eventually win out. Where all played so well, it would be most invidious to make comparisons, but in a few instances special mention should be made. The batteries did excellent work. Wood and Sharpe for the painters, worked their signals to the utter dismay of the best bats of the plumbers. Swanston and Passmore for the plumbers kept the painters guessing for the opening innings, but then weakened and allowed their opponents to walk away with the game. Brilliant catches featured the field work of both teams, but the painters had the edge on their opponents, Paris, Cheshire and Cox distinguishing themselves by difficult catches after long runs. Maxwell and Stevenson on first base did good work for their respective teams.

Alexander the Great was on third for the painters, and Farthing amounted to a great deal more than his name implies in the same position for the plumbers. Hicks worked hard on second for the plumbers, and if he had only been able to stand on his feet he would have very materially lessened the score of the winners. Stewart N. Hughes, who cavooted around the pivotal sack for the painters, looked very much like a rainbow in his variegated sweater as he made some wild dashes after swiftly receding balls. When Stewart planted himself in front of the sack it was a pretty hard matter for the base runner to get past his avoirdupois. The short stops attended all right to what little came their way.

The game was a thriller from start to finish, each team being cheered on by a goodly bunch of enthusiastic fans.

The umpiring of Messrs. Fullerton, Sinclair and Malone was unimpeachable. Everything went, and both teams expressed their pleasure at the impartiality shown.

The two busiest men on the field were the scorers, as the following official score shows:

Master Painters.

	R.	O.
Wood	7	1
Sharpe	3	5
Stevenson	4	3
Hughes	4	4
Alexander	6	3
Robinson	2	2
Cheshire	4	2
Paris	6	2
Cox	5	1
Tylor	2	1
	43	24

Master Plumbers.

	R.	O.
Maxwell	1	2
Farthing	1	1
Ferguson	2	4
Griffiths	4	2
Travers	2	3
Cooper	1	2
Passmore	0	5
Hicks	1	3
Swanston	2	3
Smythe	1	0
Max	0	2
	15	27

The steel used in heavy guns is required to have a tensile strength of 40 tons per sq. in., that for field guns 60 tons per sq. in., that for shrapnel shells 55 tons per sq. in.

Conservation of the Heat Unit

Heat Units, Like Time, Represent Money and Should be Conserved Wherever and Whenever Possible—Money Can be Saved for the Customer and Earned by the Sanitary and Heating Engineer.

IT is only during the past few years that we have heard of covering hot water or steam furnaces, which are used exclusively for heating purposes. Piping, too, in days gone by, was very seldom covered, and even to-day there are still miles of steam and hot water mains as well as thousands of boilers devoid of any kind of covering.

Some 15 or 20 years ago, it would have been looked upon as almost a waste of money to cover a heating furnace. To-day very few warm air furnaces have any asbestos lining in them worth mentioning, and seldom are the warm air pipes covered at all. There is yet another appliance in almost every home which has received no attention whatever, that is the range boiler. As everyone of our readers are aware, the range boiler is a hot water storage reservoir and as such, the water must be heated if a good supply of water is necessary. Now, it costs something to generate heat, whatever may be the purpose for which the heat is required. If for a hot-water furnace, then there is a great loss of heat **at the furnace.** The same applies in the case of a steam or hot air furnace, or a range boiler.

The writer has many a time turned a poor heating installation into one of the most efficient without burning one ounce more fuel, but simply by covering the furnace and mains, and he has secured similar results with the warm air furnace. Just imagine the amount of exposed heating surface there is in a basement where a warm air furnace is installed. Then turn to the range boiler. The surface of an ordinary 30-gallon range boiler is approximately 16 sq. ft. Suppose the water is heated by a gas water-heater, what is the heat loss?

Again, there is the gas water-heater itself. Very few of these are covered, and why not? Because of the expense, a mere matter of first cost; and, in fact, that is the cry all along the line. The first-cost cry has been the means of more waste than anything else in existence. A cheap, or rather shall we say, a low-priced article or installation almost without exception will pull an order, and why? Simply because those selling the goods have not pointed out that it pays best to consider upkeep, or cost of maintenance. The size of an ordinary gas water-heater is, we will say, 18 inches high by 8 inches diameter; this would be 3 feet of exposed heating surface, and we venture to assert that there are very few gas water-heaters but what could be made at least 30 per cent. more effieient if they were covered as well as the range boiler. This would mean that for every dollar spent in gas 30 cents could be saved, bringing the gas consumption down to 70 cents instead of $1. The same argument applies with the furnaces. To-day there are manufacturers who make all manner of coverings. Asbestos jackets can be bought for range boilers simply because such boilers are more or less standardized now. With furnaces it is a little different but still all kinds of covering can be had which was not the case a few years ago. The question of conservation is **the most vital question of the hour.**

If an athlete has a certain race to run, he does not rush at it for all he is worth right at the start. No, he conserves his strength, that he may be able to endure to a victorious finish.

The gospel of conservation is the one which will not use up our resources, but rather save. It is not the price of fuel, be it coal or gas, which makes it cheap, but rather the amount of gas or coal we can really convert into service.

We buy coal so as to convert it into heat units, there are a certain number of B. T. units in every pound of coal, just as there are in a cubic foot of gas. If coal be used for heating water for radiation, the B.t.u. should be simply converted from coal to heat with the least possible waste, and to do so, boilers and piping should be properly covered so as to conserve those heat units. Besides the covering, a proper chimney should be provided and a good sized furnace.

If a furnace fire has to be forced, the best heating properties fly up the chimney. It is the same if there is not sufficient radiation furnished. In the latter case, whatever size the furnace, it will have to be forced so as to increase the temperature of the water in the radiators to enable them to throw off heat enough to heat the room.

Similarly with a gas water heater, if water is drawn off too quickly, or if the range boiler is not covered then there is a great heat loss. On the one hand, the water is not retained in the coil for sufficiently long a period to enable the flame to penetrate the water; on the other hand when the water is heated, it is lost by radiation.

If our readers will go over any ordinary heating system, be it either steam, water or air, and figure up the amount of exposed surfaces, then compare the result with the amount of heating surface in the building, whether house, factory, office or workshop, they will be surprised. Or let them measure the coil of a gas water heater and compare the result with the amount of exposed surface of the heater, and range boiler. These few arguments go to prove two things.

First, that all appliances used for heating purposes, whatever they be, should be properly covered resulting in a saving of fuel, either coal, gas or oil.

Second, that if sanitary and heating engineers will take up this problem, they will assuredly increase their business in no small degree; and, any customer who has been prevailed upon to invest money in such covering appliances will find a benefit the moment the furnace fire, or gas water-heater is put into operation.

NEW BOOK ON STEAM TRAPS.

The Morehead Manufacturing Co., of Woodstock, Ont., and Detroit Mich., are distributing a splendid booklet describing their steam trap. It is beautifully gotten up, full of data, and should be on the book shelf of every sanitary and heating engineer in Canada. This useful book may be procured free by writing to either of the above-named offices.

"It is not what we earn which makes us rich, it is what we save."

CONVENTION OF CANADIAN SOCIETY OF SANITARY AND HEATING ENGINEERS.

(Continued from page 26.)

the credit was not due the St. John local; that they had been materially and ably assisted by the various manufacturers, jobbers and their several representatives. He was pleased to hear that the visitors had enjoyed themselves despite the inclemency of the weather, and he moved that the vote of thanks be extended to the manufacturers and supply houses. This was unanimously carried.

Mr. Crawford begged to remind the members that the last item on the programme would be carried out, that the members meet at the top of King street and join in the auto ride to Loch Lomond at 2 p.m. A splendid banquet had been provided and upwards of twenty-four autos had been procured.

After the singing of Auld Lang Syne and the National Anthem, the session came to a close.

Next year the twenty-first annual convention will be held in London, Ont., in June. The dates will be definitely decided later by the executive.

Trip to Loch Lomond.

Every day during the convention the weather man did his best to dampen the spirits of the members and friends. Even the auto ride to Loch Lomond was no exception, but in spite of the rain, the crowd turned out, over a hundred paying a visit to the Ben Lomond Hotel. Every auto was crowded. Needless to say, full justice was done to the dinner, presided over by W. J. Crawford, provincial vice-president. On account of the rain, which did not let up during the afternoon, the proposed sports, outdoor amusements and motor boat trip on the lakes had to be called off.

The Magic Plumber in Package.

This brought to a close one of the most successful conventions ever held in the history of the association. Several members questioned whether it would have been as successful as it had been from a business standpoint had the weather been finer, because of the fact that fine weather is always more or less associated with sight seeing, and no doubt the rain held the boys to business.

Master painters after the [illegible] of rings made round the plumbers

THE MAGIC PLUMBER.

Abbot Hardware Co., 636-638 Columbus Avenue, New York, N.Y., offers to the Canadian trade the Magic Plumber, a preparation which it is claimed thaws frozen drain pipes, clears refrigerator drains, dissolves accumulations of lint, cloth, hair, slime, grease, sponge, chamois, vegetable matter, cigar and cigarette butts, chewing tobacco and leather in drain pipes.

The makers claim that, in addition to its usefulness for clearing clogged-up waste pipes, it will clean, deodorize and disinfect garbage cans, toilet bowls, urinals, etc.

VERILITE ATTACHMENT.

The Duncan Electrical Mfg. Co., Limited, 86 Grey Nun Street, Montreal, Que., have just devised and placed on the market a new battery lantern attachment to be sold under the trade name of "Verilite."

The makers claim for this device a very much more efficient reflector and lamp with all the parts fully insulated in order that no loss of current is possible. The attachment fastens on with the two screws provided on batteries, and is very simply attached in this respect. The carrying handle is made to swing over to either side of the device when battery is placed on the side for convenience. Moreover, this device is made to centre on top of battery, making the most desirable balance in carrying. The hand is not cramped by placing through a small aperture as is usual with this type of fixture, and in all the manufacturers have endeavored to give high value.

Also this is made to place on the market at a retail price to the customer of $1, packed in small cartons highly suitable for shelving.

The "Verilite" operates on any style of common battery.

Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WATER NOT HOT ENOUGH IN BATHROOM.

Editor, The Sanitary Engineer.—In the last few issues of your journal you have taken up the question of gas water heaters a little more than you usually do. I have never installed very many but business not being just as good as I would have liked it to be, I have taken a little more interest in gas water heating, and have installed a few of these heaters recently.

I have a little trouble at present with one of these jobs where I had to put in a gas water heater, and a new sink. There never was hot water in the house before so you see I had to put in the range boiler as well. The water up in the bath-room does not come anything like as hot as it is at the sink, the sketch I have sent you shows how I have piped it, as well as the sizes of pipe. Can you tell me why the water at the sink is hotter than that up in the bath-room?

S. E. R., Manitoba.

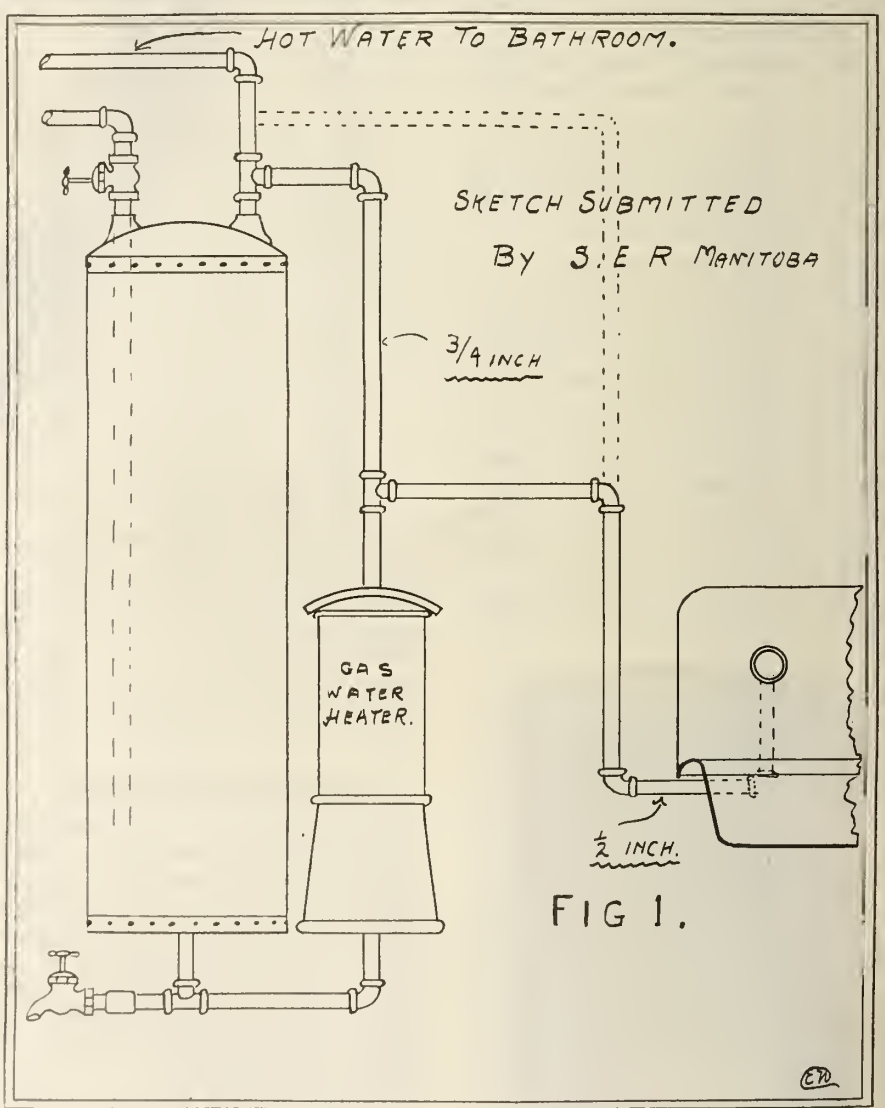


FIG 1.

Fig. 1 is sketch submitted by S. E. R. In the first place the piping plan is scarcely as desirable as it might be. To some extent the trouble is caused by the pipe to the sink being taken off so close to the heater.

This, of course, is not the whole trouble. It will be noted that the pipe to the sink is approximately two feet lower than the top of the boiler, and of course the head of water in the boiler has a tendency to force the water up through the heater from the bottom, and when the hot water tap at the sink is turned on, the hot water flies to the point of least resistance. The taps in the bathroom would easily be 8 or 9 feet higher up, thus requiring a greater pressure to force the water to a greater height. It must however, be admitted that the heater is doing good work to heat the water as it were almost instantaneously. The dotted lines show how the pipes should have been run to the sink. The most approved method to adopt so as to get the best and most uniform hot supply of water would be to insert a non-bypass tee next to the boiler: this would prevent the water being coldest at the bottom of the boiler from being forced up through the heater and thus in turn mixing with the hottest water at the top of the boiler.

Another very good point which would be well for sanitary engineers to draw the householder's attention to is this:

(Continued on page 40

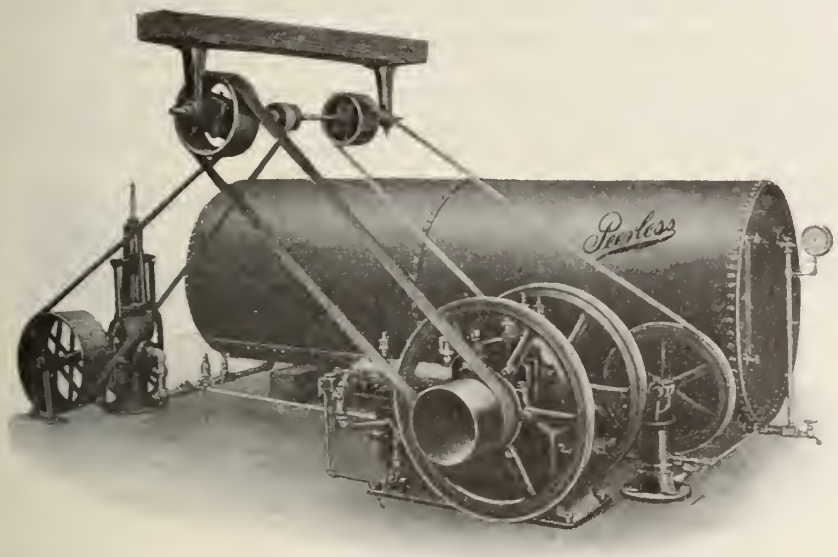
WATER Peerless SYSTEMS
"MADE IN CANADA"

Peerless Water Systems

—and—

Farm Machinery

can be operated from the same line shaft.



Connect up your customer's grinder, churn, cream separator, saw, etc.

There is a great field here for you. The work is simple and the profits satisfactory.

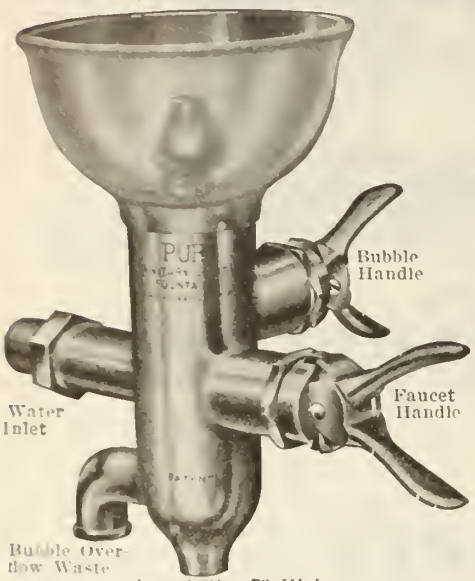
Send us information about the plant to be operated. We'll give you a layout and a price on everything you need to complete the job.

We know your needs—make use of us.

National Equipment Company, Limited

Toronto, Ontario

PURO
(MADE IN CANADA)



Actual Size 7" High.

Stop That Waste of Water

Did you ever stop to think how many gallons of water are wasted by the old-fashioned drinking faucet?
Puro saves 35% of that wasted water.
Puro does away with the old-fashioned unsanitary tin cup; it is the Safety Sign of pure water in every factory where it has been installed.
Employees like it because it is clean—because it insures a clean, fresh drink—because it saves their time.
The Puro Sanitary Drinking Fountain has a positive control that eliminates spurting.
Easily attached—positively fool-proof—and nothing to wear out.
An excellent investment—for shop and office alike—and one that pays dividends in real money on water saving and better workers.
Write today—now—tell us how many men you have and the number of departments.
We'll make you a complete estimate on an installation—we will also make you a special proposition for a try-out in any one department.

"PURO-FY" Your Water Supply

Puro Sanitary Drinking Fountain Company

SAFETY FIRST PURO ECONOMY ALWAYS

147 University Ave. TORONTO, CAN.

WATER NOT HOT ENOUGH IN BATHROOM.

(Continued from page 38.)

That the hot water tap should never be turned on full, because there is always a tendency to induce by-passing and thus really pulling the water through the heater faster than it can get heated.

VENTILATORS FOR LOCAL VENTS.

Editor, The Sanitary Engineer. — A question has come up in connection with a contract I am working on concerning local ventilation, would you please let me know what is your opinion in this matter? The architect simply calls for local vents, and no coil or even ventilator on the terminal, and I maintain that such local vents are merely a farce. It is a building in which there will be 20 w.c.'s, 4 on each floor. If it were simply a single bathroom or even two, I would put them into the chimney, providing they would not injure the draft, and there were to be a constant fire kept on.

Local Vents, M.

We are of the same opinion as our enquirer regarding local vents, they are a farce if not effective, and there are thousands of feet of local vent pipes installed which are absolutely useless.

If the terminals of this particular installation are so situated that the wind has a free course a good ventilator would be all that could be desired, an ordinary Emerson top would answer very well. But if the terminals were shielded in any way then we would advise the use of a steam or hot water coil. This should be placed at least three feet higher than the last local vent branch.—Editor.

NEW TESTING PLUG.

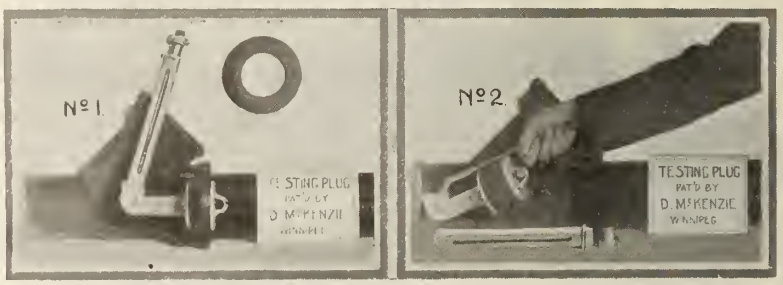
The troubles of a plumber are without number, and probably one of the most persistent is the testing plug trouble. There's the trouble getting it in and the trouble getting it out, and after you get it in you never know whether it is a plug or a sieve. If the plumber has to wait a few hours on the inspector to make the test, very often by that time the trench is full of water which has to be baled out before the inspection can be made, and we will say nothing of the tantalizing tendency the old style of plug has to blow out just as the inspector arrives on the job.

Some of the claims made for the new McKenzie test plug, illustrated above, are: That it is easily inserted in the drain or stack; that the water can be run off the trench through the Y, and the trench kept dry for working in and for inspection; that should the plug leak, which is not an uncommon experience, it is readily seen and the leakage stopped by screwing up the plug tighter; that by the use of extra rubbers a 5 inch, or 6 inch pipe can be stopped with the same plug and through a 4 inch Y if necessary—a very distinct advantage.

These are only a few of the many advantages of this panacea for testing troubles; many others, it is claimed, would occur to practical men on a closer acquaintance, such as the lightness of the plug, its simple construction and the ease with which it is manipulated.

Figs. 1 and 2 show illustrations of plug as well as the method of inserting plug into a soil pipe.

Further particulars regarding this new test plug may be procured by writing to Duncan MacKenzie, 868 Alverston street, Winnipeg.



The new McKenzie test plug.

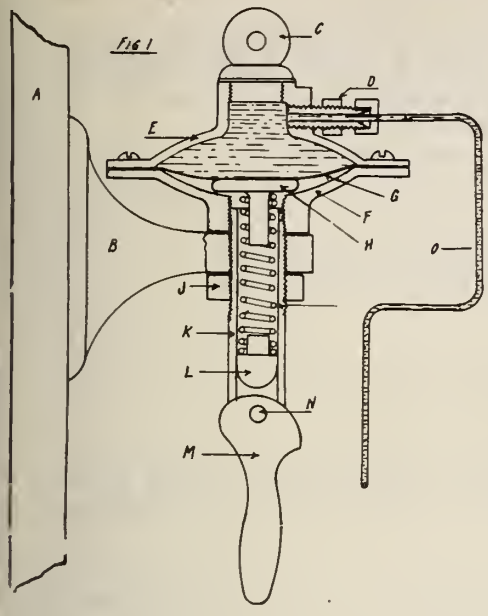
BOILER SCALE PREVENTION.

IT is extremely doubtful whether the suspension of zinc slabs in a boiler will prevent scale, states the Electrical World. Scale is due to the presence in the feed water of substances like the sulphates and carbonates of lime and magnesia. When the water is heated, these substances are precipitated and are baked on the plates and tubes. The action of zinc in a boiler is galvanic and is intended primarily to prevent corrosion of the metal parts of the boiler. To prevent scale formation it would have to change the nature of the sulphates and carbonates or else keep them from coming in contact with the boiler, neither of which it is able to do.

It is true that, in the course of the galvanic action set up by the use of zinc, hydrogen is set free at the water surface of the plates and tubes, and the liberation of hydrogen in this way, if rapid enough, might prevent scale from adhering; but it is scarcely to be believed that the feeble galvanic action set up by the use of zinc slabs could produce hydrogen at a sufficient rate to keep all sediment and precipitates from collecting on the surfaces of the metal.

DOES NOT PAY.

It does not pay to contradict a customer flatly no matter how certain you are of being right. The customer may not mind being told that he is wrong but the chances are that he will resent it and get peevish. It's a way people have when they are in the wrong.



An Invention of Great Importance

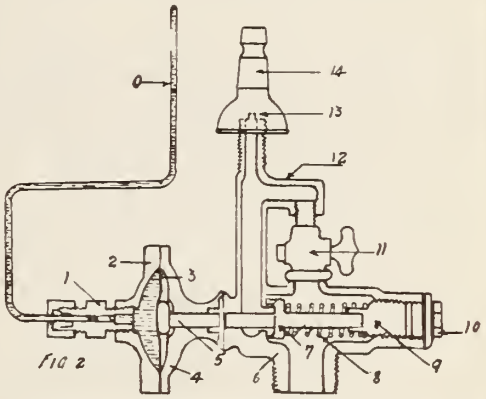
Details of the "STACK DISTANT CONTROL"

FIGURE 1.

A. Wall, on to which the control may be fastened.
B. Flange Bracket which holds the control.
C. Plug for filling the control.
D. Tube connection.
E. Top flange of diaphragm holder.
F. Bottom flange of diaphragm holder.
H. Diaphragm follower.
I. Spring, bearing against diaphragm follower and spring guide of plunger L.
J. Check nut to fasten control to flange bracket.
K. Casting containing diaphragm actuating spring.
L. Plunger and spring bearing.
M. Eccentric handle.
N. Pivot for eccentric.
O. 3/16 tubing (copper).

FIGURE 2.

1. Copper tubing connection.
2. Water end of diaphragm casting.
3. Diaphragm.
4. Gas end of diaphragm casting.
5. Diaphragm follower.
6. Casting for gas valve.
7. Gas valve.
8. Spring for gas valve.
9. Spring adjuster.
10. Cap for gas valve casting.
11. Hand control gas cock.
12. Extension piece for gas valve.
13. Tip, or spud, for gas orifice.
14. Burner stem.



The ordinary tank water heater can only be set in operation by lighting the gas when standing by the heater. If a person is in the bathroom and requires hot water, they must go downstairs to light the heater, also to extinguish it.

EASILY SOLD GOOD PROFIT WRITE FOR BOOKLET

The James Morrison Brass Mfg. Co., Ltd.
93-97 Adelaide Street West, Toronto

Our Mixed Metal Sales Amount to Over $5,000,000 Annually

We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO
New York, N. Y.; London, Eng.; St. Louis, Mo.

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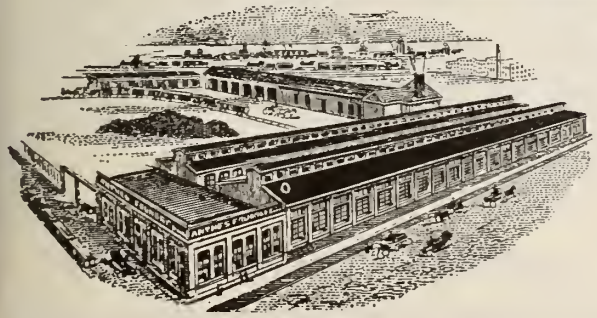
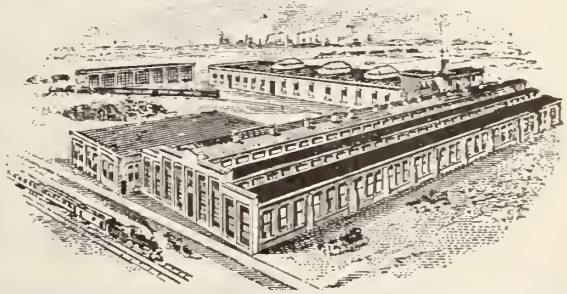


MANUFACTURERS OF
CAST IRON SOIL PIPE AND FITTINGS



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Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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Made in Canada

The Brand that has the Quality

M Brand Pipe Fittings, etc., give a service and satisfaction that will invariably get you re-orders and much new business as well.

A trial of the goods will prove this claim.

CAST IRON FITTINGS

With this brand mean fittings made with Iron of high tensile strength—proper proportions and correct tappings.

RECESSED DRAINAGE FITTINGS

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With this brand mean fittings made of Air Furnace Refined Iron, reamed and tapped to gauge with perfect threads.

Standard and Extra Heavy Flanged Fittings and Flanges. Galvanizing Malleable and Gray Iron Castings of all Kinds.

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BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes

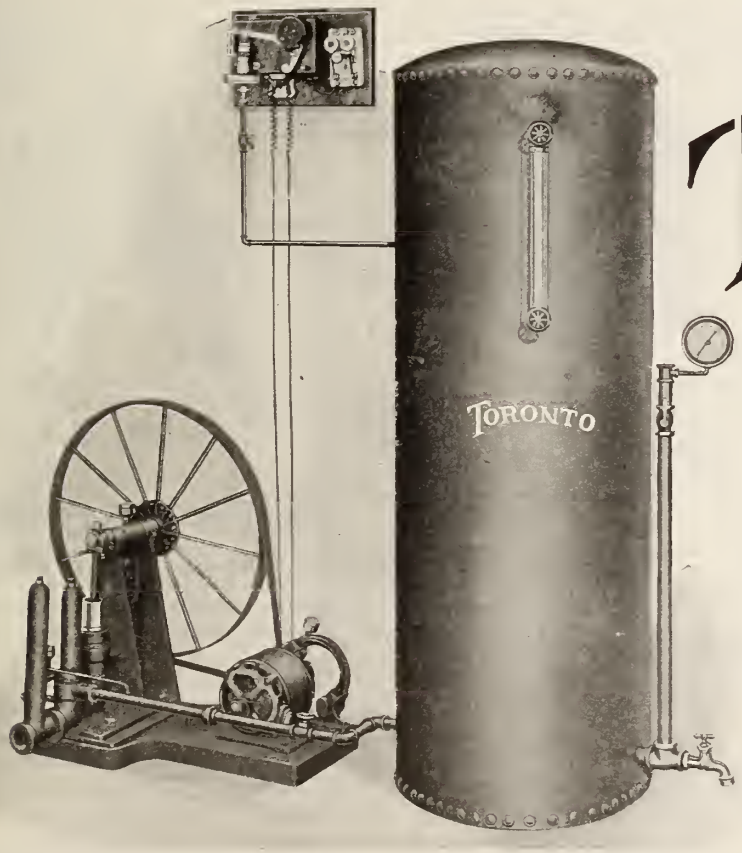
Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal

We Want You to Examine this System

It Is So Perfect That We Are Willing To Trust The Judgment Of The Practical Men Who Know Water Systems.

You who have had experience in the installation and operation of water service systems will appreciate the wonderful simplicity and efficiency of the Toronto Silent Electric House Pump Outfit. You will appreciate the many improvements—the accessibility of the valves—the brass, water-sealed trunk piston—the heavy brass cylinder—the double air chambers—and the simplicity of the arrangement for supplying air to the tank.



Toronto Silent Electric House Pump Outfit, Style "S"

TORONTO

DOMESTIC WATER SERVICE SYSTEMS

embrace hand pump outfits, electric outfits and those run by steam and gasoline engines. We are the oldest and largest firm in Canada making pressure outfits and we shall be pleased at all times to have you submit your Water Service problems to us for solution. Our Engineering department is at your service free of charge.

Send for Illustrated Bulletin "S"

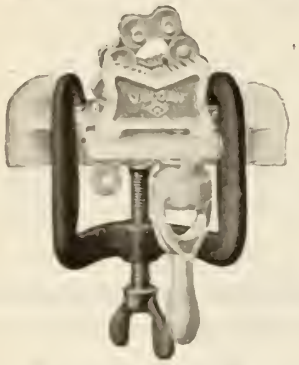
This will show illustrations of our Silent Electric Pumping Outfit with explanations of the improvements embodied in our wonderful electric house pump. It will also give prices of the pumping outfit attached to different size tanks.

Ontario Wind Engine & Pump Co., Limited
MONTREAL Head Office: TORONTO WINNIPEG, CALGARY

WILLIAMS' "VULCAN" CHAIN PIPE VISES

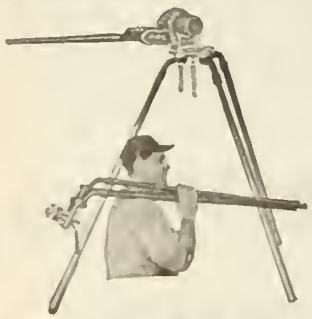
Are Handier Than Ever Now!

With a Clamp for Bench Work



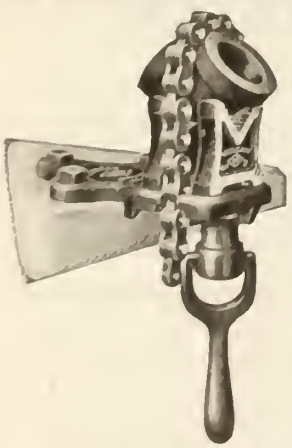
A strong Drop-Forged Clamp with Wrought Steel Screw and Swivel, specially "heat treated" to give extra strength and toughness, that is admirably adapted to enlarge the usefulness of the VULCAN VISE on Bench, Table, Sill or Chair

And a Light Mount for Field Work



Firm and portable, and furnished with or without the "Legs" of Standard Pipe Sizes, simple and convenient, that fills a long-felt need.

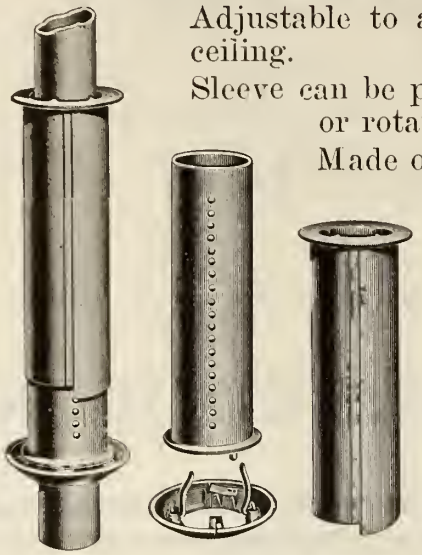
Vulcan Chain Pipe Vises are First Aid to Plumbing Work



Write for Circular to

J. H. WILLIAMS & CO.
77 Richards St.
Brooklyn, New York City

"Perfection" Adjustable Floor Sleeves



Adjustable to any depth between floor and ceiling.

Sleeve can be pushed straight up and down, or rotated to right or left.

Made of heavy sheet tin, also in galvanized iron as ordered.

Allow free circulation of air between pipe and sleeve.

Drop a line for catalog.

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Eastern Agent:—J. R. Devereux, 233 St. James St., Montreal.
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You can talk across the continent for two cents per word with a WANT ad. in this paper.

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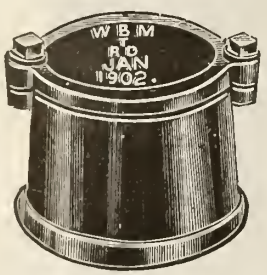
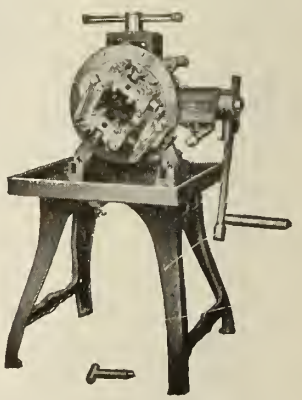


Test Plugs, Soil Pipe Fitting Specialties, Plumbers' Repairs and Alterations. Light machine work.
Send for Catalogue.

Malcolm & Company
64 LOMBARD ST. TORONTO



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Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

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Consulting Sanitary Engineer

Advice and plans on

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¶ It is the Company's constant endeavor to give to the Trade in the Maritime Provinces, the very best that is to be had, both in service and materials in the plumbing supplies business.

¶ That our efforts have met with approval from the Trade is evidenced by the growth of our business.

¶ It will be our endeavor, in future, to do even better by our customers than we have done in the past.

St. John, N.B., July, 1915.

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SMOOTH FINISH, REINFORCED ANTI-RUST STRIP IMBEDDED ON TOP EDGE. SIZE 4 FT. OVER ALL. DRAINS TO CENTRE. CEMENT STAND. COMPLETE.

Its durability assures exceptional service and satisfaction.

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Learn to be an EXPERT in Plumbing, Sanitary Science and Engineering

Be among the men in the trade who get paid for what they KNOW, not for the hard work they do.

Does not interfere with your present position. **You study at home** and when our course is completed, you are eligible for membership in the American Society of Sanitary Engineering, without further examination.

Start in right now to prepare yourself for a better position and **more salary.** Our course is complete and practical and the fee reasonable.

Before turning over this page, write for our **Free Booklet** and full particulars. Costs but a cent and will mean dollars to you.

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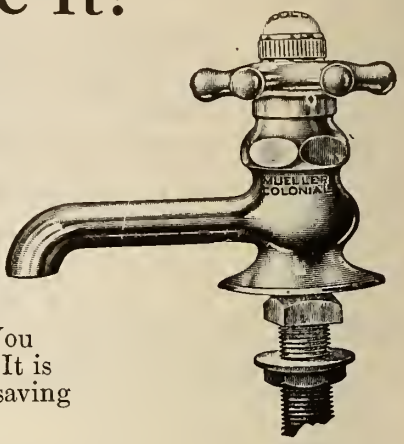
Compare it with other goods—make your investigation as thorough, and as rigid as you can. We know that your ultimate decision will be for

MUELLER
Colonial Self-Closing Work

MUELLER Colonial Self-Closing Basin Cock.



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A strictly high-grade article, designed to give the utmost service. You will make no mistake in specifying Mueller Self-Closing work. It is giving absolute satisfaction in hundreds of big buildings and saving money for the owners by eliminating water waste.

All Mueller Goods are tested under 200 pounds hydraulic pressure and Unconditionally Guaranteed.

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Send me literature and prices on Self-Closing Work.

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Makers of High-Grade Water, Plumbing and Gas Brass Goods.

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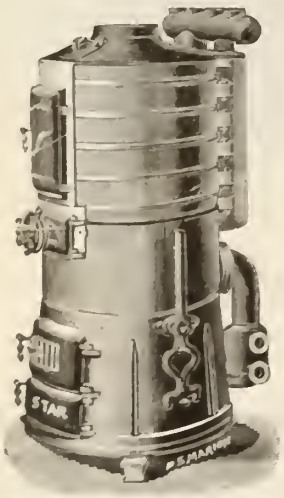

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The "New Star"
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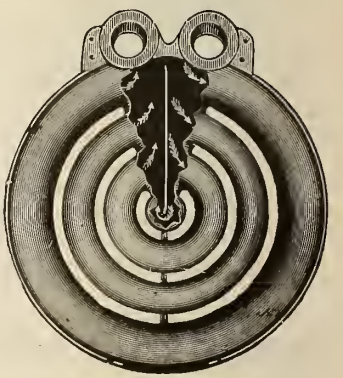
The most improved on the market. The only Heater having a *Tubular section* giving one-third more heating capacity than any Flat Section Heater, and dividing the water, making it easier heated.

Over 35,000 New Star Boilers in use, all giving entire satisfaction.



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Absolutely Trouble-Proof

When pipes are connected with a Dart Union there is no possible chance of a leak.

There is no deterioration at the joint because both faces are of bronze.

There is no pulling apart or stretching because the iron parts are very heavy.

BRONZE TO BRONZE AT THE JOINT

The Dart goes on easily and quickly whether pipes are in or out of alignment.

It's a time-saver and a customer-holder.

Your jobber supplies them.

Dart Union Co., Limited
TORONTO, ONT.

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NOW IS THE TIME to show your patriotism. and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

This plant is at your service.
Help us keep it busy.

Quickest possible deliveries. Consistent Prices. Best quality of goods. Write for Catalog No. 5.

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Valves and Hydrants Exclusively

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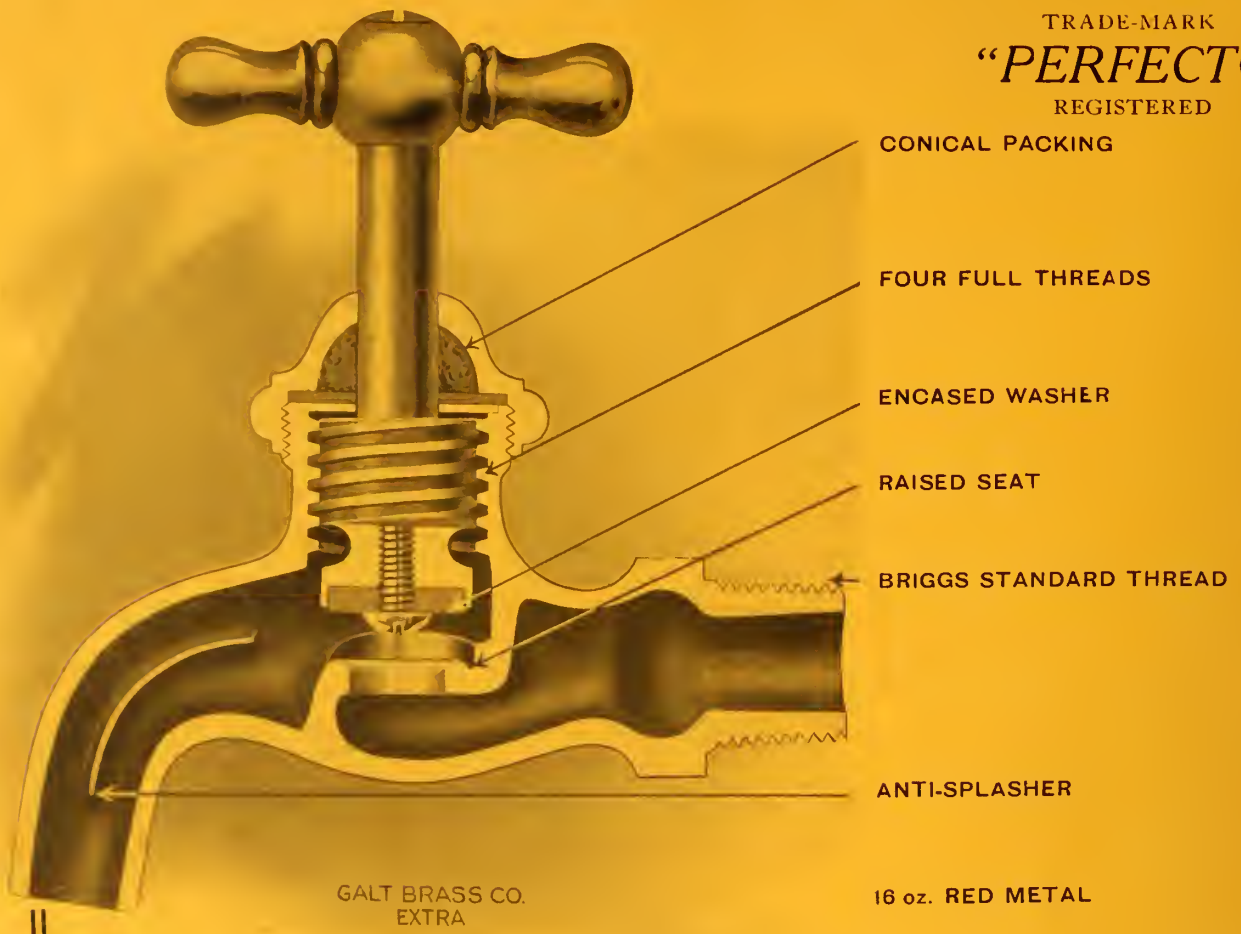

The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER

PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX | Publication Office: TORONTO, JULY 15, 1915 | No. 14

AT YOUR SERVICE

Interior Views
"Standard Ideal"
Showrooms

Montreal *Toronto*

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Our Showrooms are at your service—all the facilities they afford are available any time—always, for your interests or the interests of your customers or prospects.

All of our showroom fixtures are priced in plain figures—and provide a liberal profit for the plumber.

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The Largest Exclusive Cast Iron Enameling Sanitary Works Under The British Flag.

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Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

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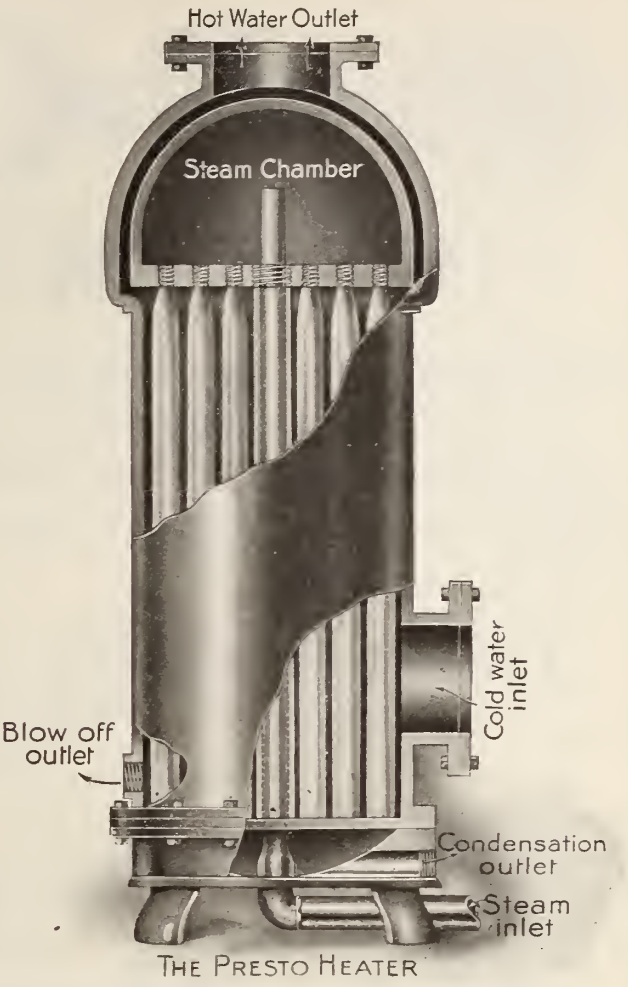
We Want Every Reader of this Paper To Write Us For Full Particulars Regarding the PRESTO HEATER

It is the most efficient on the market and no Heating Engineer can afford to be without the information that we have.



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One of them has "Promised to Accept."

This is all the satisfaction that we can get—

The only conclusion we can reach is that the other heater manufacturers are willing to concede that our heater is, as we claim, **25% more economical than any other heater on the market.**

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B-O-T

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WATER CLOSETS

WOODWORK: Guarantee against cracking and splitting. Tanks are lock-doweled; Seats spiral-doweled.

FITTINGS include B-O-T "FOOL-PROOF" LEVER and B-O-T BALLCOCK.

BOWLS: All kinds, as well as the B-O-T "Non clogging" Bowl with the straight expanded leg.

The B-O-T Mfg. Company, Limited

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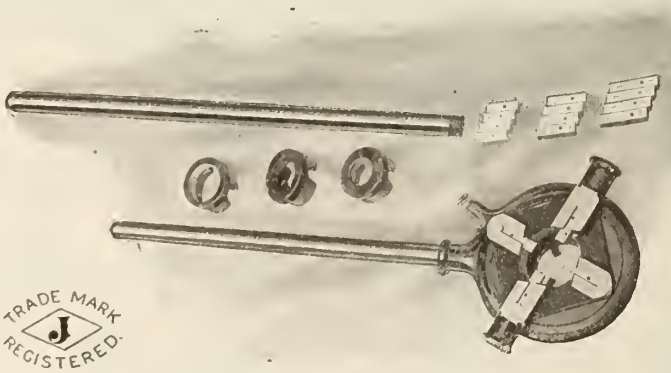

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Capacity 1" to 2" inclusive.
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The Correct Cutting Principle of the Lathe Tool is Applied to the Cutters of

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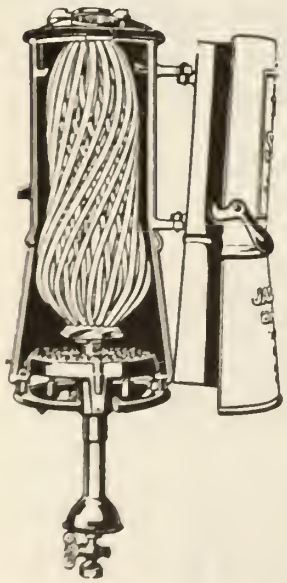

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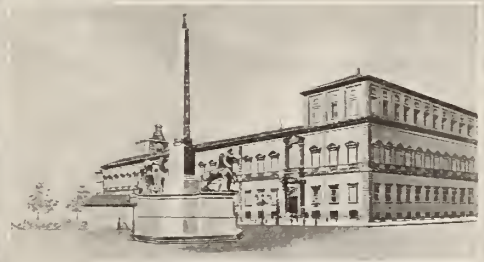

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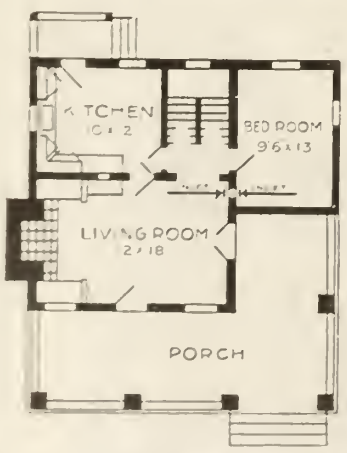

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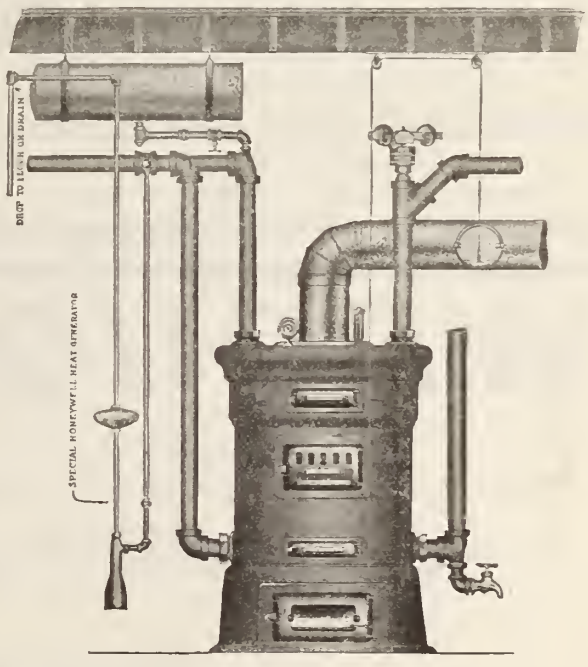

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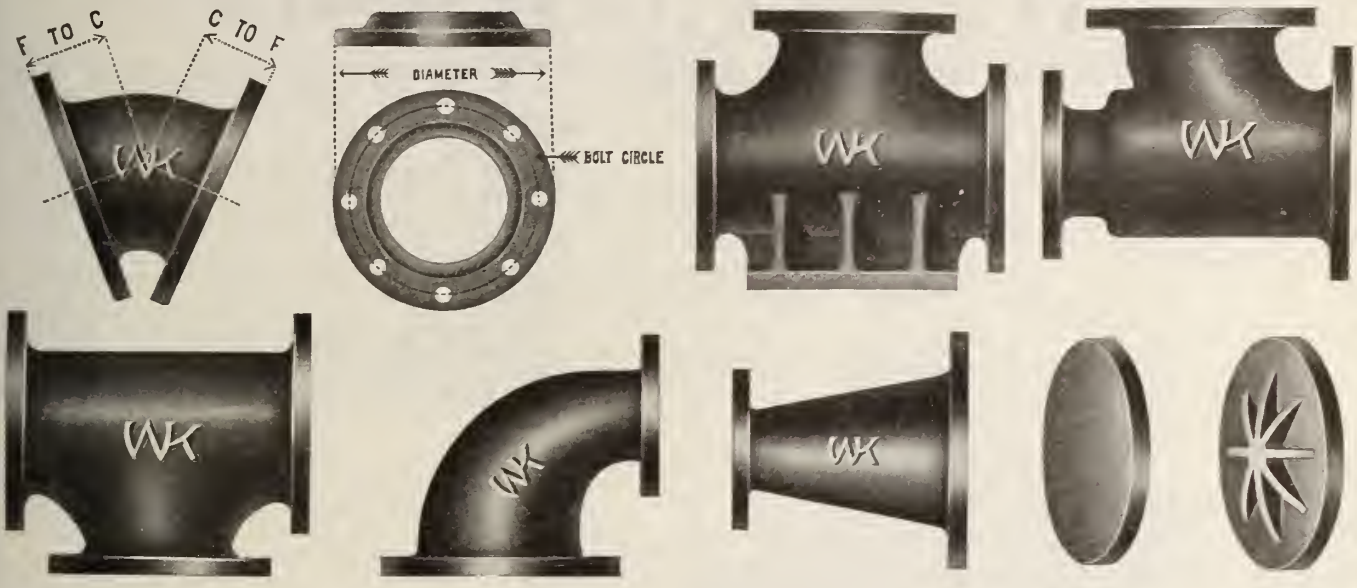

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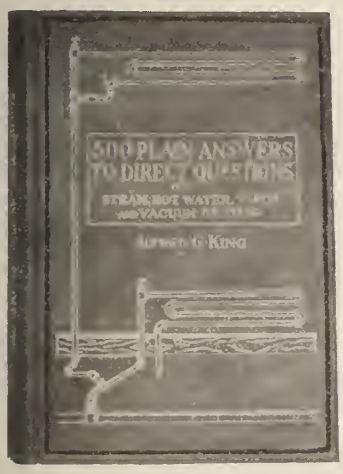

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PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, JULY 15, 1915 No. 14

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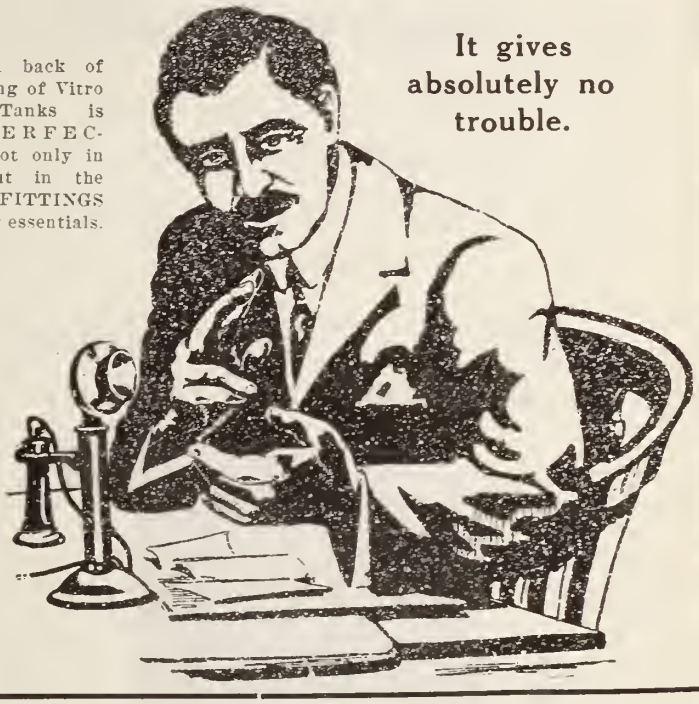

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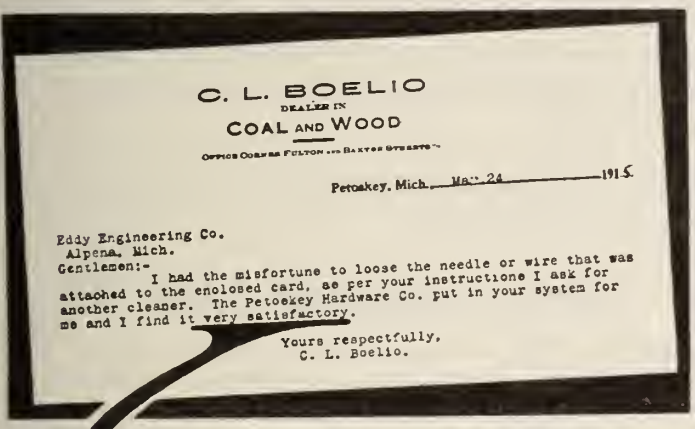

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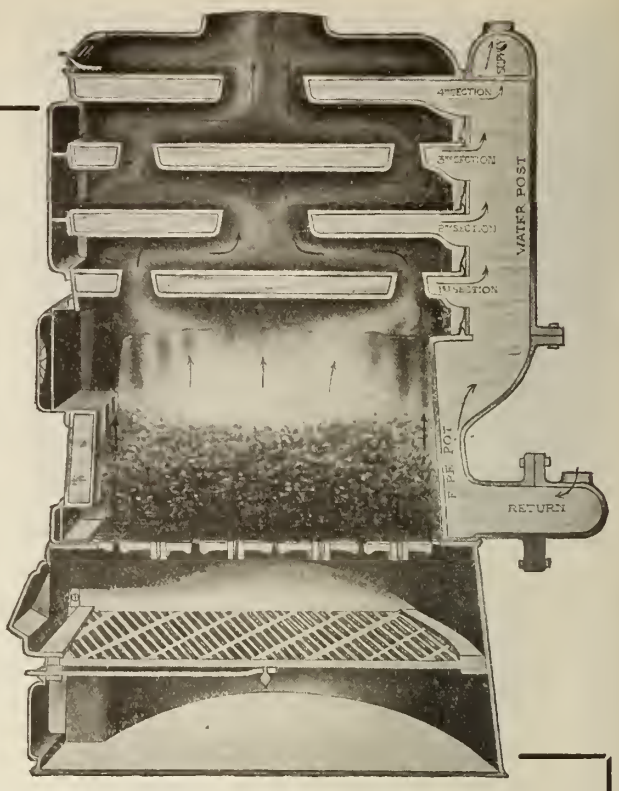

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THE SANITARY ENGINEER

VOL. IX. JULY 15, 1915 No. 14

Ontario Workmen's Compensation Act

Being a Memoranda With Reference to Assessments and Rates, Medical Attention and Reporting of Accidents, With a View of Further Explaining the Working of the Act, and Setting at Rest Any Misunderstanding as to its Provisions.

A Communication from the Workmen's Compensation Board.

THERE has been in a few cases a misunderstanding as to the provisional assessment levied by the Workmen's Compensation Board, upon employers in Schedule 1 of the Act.

If it were practicable, the members of the Board would have been pleased to discuss with each employer the situation which the new law has brought about. In the large number of interviews that have taken place, a better understanding of the law has invariably been the result, but it has occurred to the Board that in the circumstances a few general statements regarding the matter of rating and assessments might advantageously be placed before employers and others interested in the subject.

First, it should be clearly recognized that the Board can have no interest in collecting more money than is required to pay the compensation for which the Act provides. A part of the cost of administering the law is being borne by the Government out of the Consolidated Revenue Fund of the Province, so that, except as to a small percentage, all moneys paid in by employers will be applied for the sole purpose of providing the compensation which the law requires to be paid to injured workmen. The intention is to provide a system of mutual protection on the basis of actual cost, and the cost is reduced by the amount so borne by the Province.

Assessments and Rates.

As an illustration of the manner in which matters will work out, take, for example, the clothing industry (Class 27). The rate named is 40 cents. Suppose there is a pay roll in this class of $2,000,000 in the year 1915, this would realize for the Accident Fund the sum of $8,000. If, after the accidents of the year have been provided for, it should be found that only $6,000 has been needed, the balance of $2,000 will be carried forward into the next year's account to the credit of this class, and the rate for the following year would be reduced accordingly to such figure as would seem sufficient. Upon the other hand, should the amount realized from the rate named prove insufficient the Class and the employers in it would be debited with the deficiency and a higher rate would require to be levied for the following year.

In every case each individual employer, no matter at what figure the estimate of his pay roll has been stated, will, as mentioned in the assessment notice, have his assessment adjusted according to his actual pay roll at the end of the year. Thus an employer, for example, with an actual wage roll of $10,000 for the year, will pay just half what an employer with a $20,000 wage roll would pay.

As to the question of the rates which have actually been fixed by the Board for 1915, most employers, we think, who have considered the situation, will have expected that these rates would be considerably higher than the old Employer's Liability rates. The basis of compensation and the maximum sum which may have to be paid are substantially higher under the new law, and the right to compensation, except in a few exceptional cases, no longer depends upon the employer having been at fault, or the workman not at fault, for the happening of the accident, and these circumstances must necessarily cause material increase in rates, though the exact extent of such increase cannot, until actual experience has been had, be definitely determined. Fortunately the Board has had the benefit of the experience of the Industrial Commissions of several States across the border (Michigan, Ohio and Washington) as an aid in considering the proposed rates for Ontario. In very many cases the rates named here are less than the experience rates in any of these States, and in most cases they are less than half the rates charged for the year 1915 under the New York State law. None of the rates for these States, of course, can in any sense be regarded as an infallible guide, for in none of the places mentioned is the scale, nor are the conditions, of compensation, the same as in Ontario.

These general observations are made with confidence that employers generally will recognize that the Board is endeavoring to deal as fairly as it can in the circumstances with an admittedly difficult problem. We would have been more than pleased could we have seen our way clear, particularly in these difficult times, to name rates lower than those proposed, but everyone will recognize the necessity of putting the Accident Fund on a sound basis at the outset, and if in doing this it should happen that some few employers have this first year been charged more than may turn out to be actually needed, the Board will be ready, as knowledge is gained by experience in the actual working out of the law, to credit back the surplus in levying the following year's assessment and to place all employers, as nearly as possible, in a position of equality, having regard to the relative hazard of their various industries.

The Board, in these matters, recognizes its responsibility as trustees of the Accident Fund for the employers and employees of the Province, and once this is generally understood, we hope, with the explanation we have given, that any misconception of the law or of the methods of carrying out will be cleared away.

We would welcome any inquiries as to any specific matters not covered in this memorandum.

Medical Attention.

The question is frequently asked, what should employers do, or what should they instruct their foremen to do, in regard

to medical attention when an accident happens to an employee.

The Workmen's Compensation Act does not deal at all with the question of medical attendance or medical fees therefor, except in fatal cases where there are no dependents.

It must not be concluded, however, that the Board is indifferent as to this matter. Apart from the humanitarian side of the question, it is not in the interest of the Board, or of employers, that payments of compensation should be prolonged by lack of necessary medical or surgical attention.

When an injured employee requires medical attendance, it is essential, of course, that he should go or be taken to the nearest doctor or hospital as quickly as possible, and it is hoped that any co-operative or other arrangement, now existing for such service, will be continued. There is nothing in the Act to prevent arrangements for such medical or hospital service. What is forbidden is to charge employees anything in the way of contribution toward the accident fund or toward indemnifying the employer against anything for which the employer himself is liable under the Act. (See Sec. 18). Unless there is some sort of co-operative or other arrangement for medical aid in connection with the factory or establishment in which he is working, the injured workman must of necessity pay his own medical expenses. In serious cases, however, there is the certainty, if reports are promptly made, that compensation will be payable without delay, and money will thus be available which will enable injured workmen to pay their medical or hospital fees. It is believed that workmen, when able to pay, will generally be found willing and desirous of doing so; but should any workman not be willing to pay what is reasonable, the power given to the Board to permit attachment of the compensation may be invoked. In cases of slight injury, causing disability for less than seven days, no compensation is payable at all, the matter being entirely outside of the Board's jurisdiction.

Mutual co-operation and assistance among employers, employees and physicians in all these matters will be to the advantage of all, as well as a great assistance in the work of the Board.

Reporting of Accidents.

The Board will very much appreciate promptness and care on the part of both employers and workmen in making reports of accidents. Upon this will depend in large measure the quick handling of claims by the Board. An ample supply of forms will be sent to employers upon request.

The employer is required by Section 99 of the Act to report to the Board, within three days, every accident which disables a workman from earning full wages. If the accident is so slight that the disability will be less than seven days (and there will, therefore, be no right to compensation under Part I), the short form of notice, Form 5 (or a letter or other writing to like effect) will be sufficient; but where, from the nature of the case, the disability will continue for seven days or more, Form 7 will be required. If Form 7 can be filled up and sent in within the three days, Form 5 may be dispensed with, but if not, Form 5 should first be sent (within the three days) and Form 7 should follow as soon as possible. If it is doubtful whether the disability will last seven days or not, it will be better to use Form 5 and await results, and if it is found that the disability does last seven days, Form 7 should be sent on the eighth day after the accident. In every case where any notice or report of an accident has been given to the Board, no matter what the length of the disability, the employer should, as soon as the workman has returned or is able to return to work, report that fact immediately to the Board, and for this purpose Form 9 may be used.

Form No. 6 is to be filled out and sent to the Board by the workman if he is disabled for at least seven days from earning full wages.

Report Form 8 is to be made by the doctor who attended the injured workman. The Board would much appreciate the prompt co-operation of pyhsicians and surgeons throughout the Province in this matter on behalf of injured workmen who, for the time being, are their patients. While the law does not permit the Board to pay for medical attention to injured workmen, it may be pointed out that the liberal compensation now payable, and the fact that it is payable in a vastly larger number of cases than where damages could formerly have been recovered, will render this class of patients, on the whole, very much better able than heretofore to meet the doctor's reasonable charges.

WATER WASTE DANGEROUS.

A recent incident in a large American city shows the fallacy of certain arguments advanced to excuse abnormal water consumption in municipalities possessing waterworks systems. After a thorough investigation which had shown that the consumption of water was excessive, the mayor of this city was credited with the following comment, "We are glad to have lots of water and waste it, for it makes . . . a cleaner city" The argument might have some weight if the facts quoted were true, but, as a rule, the wasted water does not contribute one iota to the cleanliness or health of the city. As a matter of fact, the official report of the city referred to shows that from 30 to 50 per cent. of the water pumped is returned to the sewers unused, the waste being caused by leaking faucets and closets and carelessness in the use of water. Such wasted water does not make a city nor its people any cleaner and does not furnish any protection against disease. On the other hand, the cost of supplying and distributing this wasted water has to be paid for just as if it had performed a useful function. The flow of wasted water also causes low pressure in many parts of the system, where mains are inadequate and this shortage may cause unflushed closets and other offences against cleanliness and health, besides seriously affecting the city's protection against fire.

There are numerous safeguards against water waste. The least that should be done by the smallest waterworks organizations is thorough inspection of the consumers' plumbing and fixtures. On larger systems the installation of meters is very effective and advisable, while the so-called pitometer survey will locate excessive flow or leaks in any part of the system including the distributing mains. —L. G. D.

SANITATION AT SUMMER RESORTS

Healthy Condition Should Be the Chief Attraction—Pure Air and Water Necessary.

The sanitation of summer resorts is a matter of supreme importance. A summer resort should be a place where people may go for a rest and recreation, to store up energy for work, to live for a time in closer touch with nature, and not a place whence one returns suffering with disease contracted thereat.

In the choice of a location for the summer vacation the most important questions to be considered are good sanitary conditions and pure air, food and water.

Plenty of pure air is one of the boons of the summer resort, and every effort should be made to secure to the visitors this recreative element. The air should be fresh and free from disagreeable odors. In too many cases, especially at summer hotels or large boarding houses, the air is tainted by foul odors, sometimes the result of unsanitary conditions, as the improper disposal of waste and garbage, or of the too close proximity of stable or outside closet, while sometimes it may be caused by a stagnant pond of water or a cess-pool.

Too often, also, the bedrooms in these hotels are small and poorly ventilated. In any case the windows should be as large as possible, easily opened and pro-

(Continued on page 30.)

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 8.

Ventilation.

The previous article dealt with the discomforts and ill-effects on health that might be caused by living in an atmosphere of impure air. Disease bacteria, an excess of carbon dioxide, the presence of other poisonous gases even in minute quantities, all combine to render air unfit for breathing, and either an excess or lack of moisture in the air will cause discomfort. When a number of people are present in a room or hall most of these just mentioned adverse conditions will prevail unless adequate provision is made to get rid of the exhaled impurities and to supply fresh air. As these are matters touching the health and comfort of people, it is evidently one of the duties of the sanitary engineer to investigate and correct such matters and to be instrumental in supplying pure air for the public.

The air outside of buildings is generally beyond the control of the sanitary engineer, although he may be interested in legislation and means for abating the smoke nuisance and for preventing the passage of harmful gases into the air. However, nature has provided such a large reservoir of pure air continually in motion that efforts to pollute it with foul air are fortunately generally futile.

Getting rid of the confined air that people have breathed out is the primary object of ventilation, which may be defined as the continuous and systematic removal of foul air from rooms used for habitations and for manufacturing purposes. Aeration consists in the occasional opening of doors and windows to allow fresh air to replace all the vitiated air, and is not generally included under the term ventilation.

Ventilation is also very essential in mines, cold storage warehouse, stables for horses or cows, but it is the intention in this article to explain a few of the elementary principles of ventilation that apply most particularly to dwellings and larger buildings of a similar character.

The removal of impure air from a room causes the influx of fresh or natural air, which is generally, of course, of better quality. In cold weather it is necessary that the entering air should be heated, and consequently heating and ventilating are very closely associated. Unfortunately the average person considers only the heating as important. More clothing may make up for a low temperature, but nothing can make up for the continual breathing of impure air, which in time will weaken the body and make it an easy prey for disease, which disease is frequently caused by bacteria carried in the impure air. However, it is generally in the reverse order that the problems of ventilation receive attention.

The requirements for the proper ventilation of a building are:

(1) The admission of a sufficient quantity of pure air of sufficient humidity, with the accompanying egress of vitiated air.

TABLE IV.

Kind of person or burner.	Cubic feet of Carbon Dioxide per hour.
Full grown male	0.7
Full grown female	0.6
Child	about 0.4
Candle	0.3
Ordinary oil lamp	1.2
Common gas burner	1.2

The dwelling that is inhabited for the greatest part of the day is the home, and it should, therefore, receive the first attention with regard to ventilation. The school, with its small children confined for six hours or so of the day, comes next in importance, for children are more easily affected by bad air than are adults. Ventilation for the factory and office is also important. Large public buildings, like churches and theatres, where large numbers of people congregate, might be placed last in importance, for, while the discomforts arising through poor ventilation may be acutely felt, they only last for a relatively short time, while poor ventilation in other buildings has a more continuous effect.

(2) The distribution and circulation of this pure air without causing draughts.

A person actually inhales and exhales about 20 cubic feet of air per hour, but, while the amount of carbon dioxide in fresh air is about four parts in 10,000, the exhaled air contains over 100 times that amount. To sufficiently dilute this amount of carbon dioxide about 100 times the amount of air actually required for breathing is necessary, or about 1,800 cubic feet per hour per person. This amount is generally accepted as the least allowable. It dilutes the carbon dioxide given off until there is altogether in the air 8 parts in 10,000 of carbon dioxide.

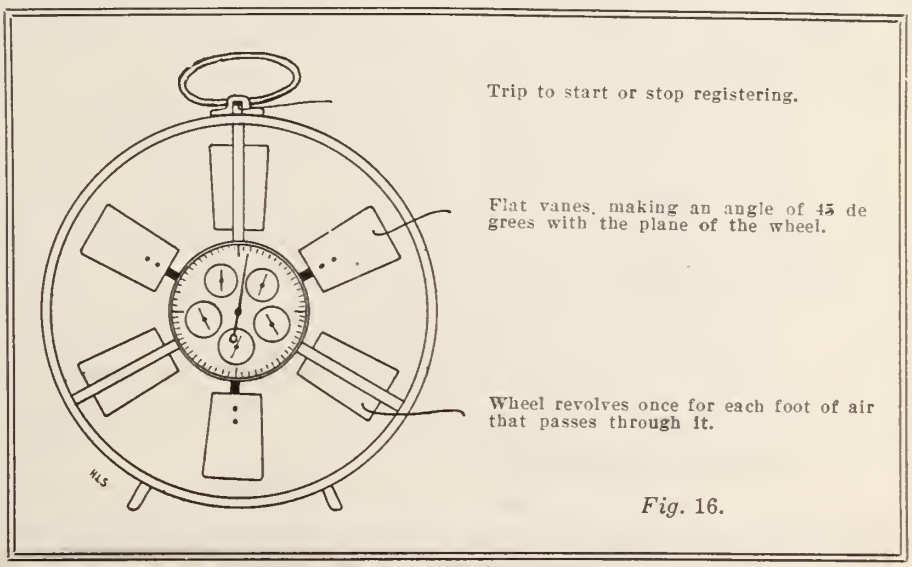
Trip to start or stop registering.
Flat vanes, making an angle of 45 degrees with the plane of the wheel.
Wheel revolves once for each foot of air that passes through it.
HLS

Fig. 16.

Diagram of an Anemometer.

Candles, lamps, gas burners also use air, and give off carbon dioxide. Table IV. shows the amount of carbon dioxide given off by various people or burners.

Stoves also use up air, and a pound of coal in burning uses up about 160 cubic feet of air. The products of combustion, however, do not as a rule escape into the room, but go up their own "ventilating flue," the stove pipe and chimney.

The following formula shows how the quantity of air required per hour in a room can be determined:

$$A = \frac{C}{l - a}$$

Where C = cu. ft. of CO_2 exhaled or given off per hour.

l = cu. ft. of CO_2 permissible in 1 cu. ft. air.

a = cu. ft. of CO_2 at first in 1 cu. ft. air.

A = quantity of fresh air required per hour.

For example, if in a room there are four people (a man and his wife and two children) and two lighted gas burners, and it is desired to keep the amount of carbon dioxide in the air to 8 parts in 10,000, or .0008 cu. ft. carbon dioxide to 1 cu. ft. air, then:

$$A = \frac{.7 + .6 + 2 \times .4 + 2 \times 1.2}{.0008 - .0004} = \frac{4.5}{.0004}$$

11,250 cu. ft. per hour.

If the room is, say, 20 ft. x 15 ft. x 9 ft., then as the cubical contents of the room is 2,700 cu. ft., the air should be changed about four times per hour. It is evident that the number of times the air in a room has to be changed depends on its size. It is recommended that the size of a room be such that it allows 1,000 cu. ft. of air per person, and that the air be changed 3 times an hour. It is also essential that a certain floor area be allowed for each person, however great the cubic space allowed. Table V. contains information in regard to the amount of air per person generally allowed in different buildings.

The entering fresh air may not contain sufficient moisture in the form of vapor to make it suitable for breathing. Water vapor can be added in a number of ways:

(1) By injecting steam into the entering air current.

(2) By passing the air over the surface of water in evaporating pans.

TABLE V.

Class of building.	Floor area sq. ft. per person	Cubic space cu. ft. per person	Fresh air per hour cu. ft. per person
Schools	10- 15	200- 250	1800
Theatres	9	108	1800
Hospitals	100-200	1000-1400	2000-3000

(3) By passing the air through a spray of water.

In all the above cases the water is added in the form of vapor. Mere wetting with water is of no use for the purpose of increasing the humidity.

Having decided on the quantity and quality of the air necessary for ventilation, the problem of uniform distribution of the air must be considered. Ventilation may be accomplished in two ways—by the natural or gravity method or by the mechanical method.

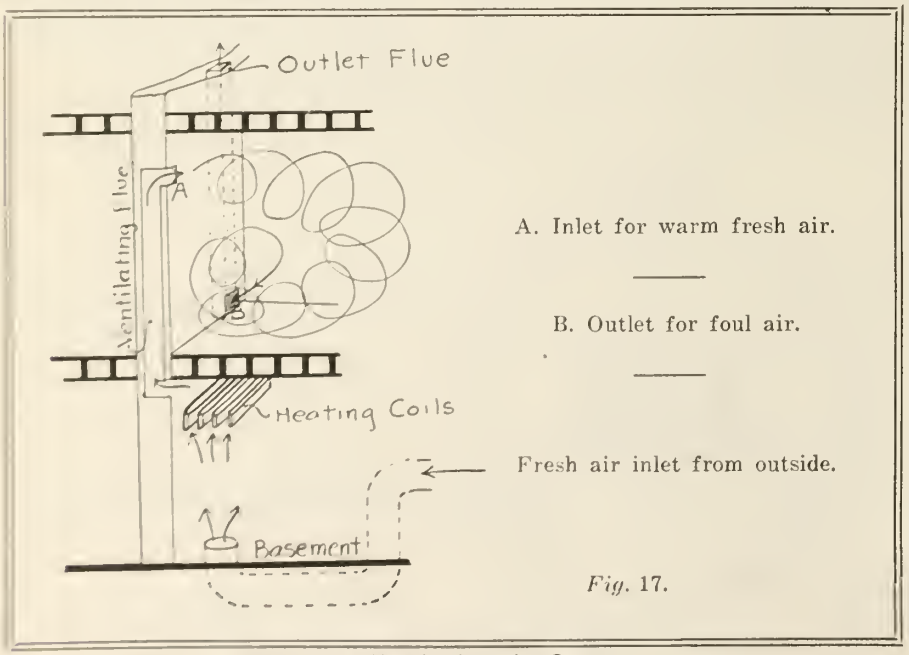

Fig. 17.

Illustrating Ventilation of a Room.

Heat is required in the natural method of ventilating. The volume of air, like any other gas, increases with the temperature, and air is consequently less dense or lighter when heated. It will rise in a ventilating shaft or flue (see Fig. 17) if it is at a temperature higher than that of the surrounding air.

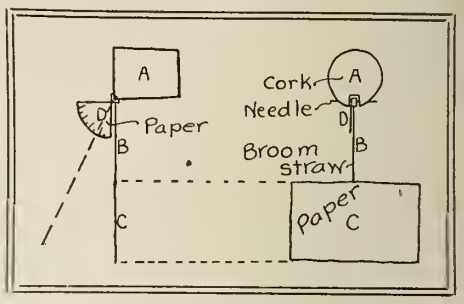

Fig. 15.

A Simple Anemometer.

Ventilation by the mechanical method is generally accomplished by means of revolving fans, and is more efficient than the natural method, especially for large buildings. With a fan, fresh air may be forced into the room or foul air exhausted from it, but the first way is generally preferable.

To prevent draughts, which are unpleasant and often unhealthy, the entering fresh air should not have a velocity greater than 6 feet per second. It is often necessary to determine the velocity of air currents by direct measurements. An instrument for accomplishing this is termed an anemometer. Fig. 15 shows an anemometer made of simple materials. It is not, of course, an accurate instrument, but will show from day to day, if placed in the face of a ventilating register, the relative velocity of the air entering the room. The paper suspended from the cork which is shoved in between the grilles of the register hangs straight down when no air is passing and swings up as the velocity of the air increases. The instrument indicated in Fig. 16 is a high-grade anemometer about the size and cost of a good watch. As the velocity of an air current in a shaft or flue is greatest in the middle and due to skin friction less at the sides, the mean velocity of the current can be found with such an instrument by taking a number of readings in different positions across the current.

Knowing the amount of fresh air required and the velocity at which it can be allowed to enter, the size of flues and registers can then be readily determined. It is not practicable to put in a ventilating flue (which is preferably circular) of less than 5 inches diameter. For large rooms or halls a number of small inlets are installed instead of one large inlet. From 10 to 50 per cent.

(Continued on page 31.)

"Gas Talks" to Sanitary Engineers

This Article is Written, Mainly With the Object of Encouraging Sanitary Engineers, Gas and Steamfitters, to Make More and Greater Efforts to Sell Gas Appliances, and to Point Out to Them the Immense Possibilities There Still are for the Sale and Installation of These Appliances.

No. 1, by E. M. Paterson, Consumers' Gas Co., Toronto.

WHEREVER gas, either natural or artificial is obtainable, it is an undisputed fact that for years past the great majority of sanitary engineers have allowed opportunities of adding to their business to slip by, by not demonstrating and selling up-to-date gas appliances. In many instances this state of things has been brought about by a wrong conception on the part of the sanitary engineer of the fact that, despite the competition of electricity, both in the illuminating and fuel fields, the consumption of gas has steadily increased—and an apparent willingness on their part to allow such competition to over-rule their better judgment.

To quote only one instance illustrating the continued growth of the consumption of gas in Toronto — the quantity of gas consumed in the city has doubled during the last six years, although competition of electricity has been far stronger in this locality than in any other place where gas is sold in the Dominion. This extra consumption means the sale and installation of more and more appliances, a large percentage of which could undoubtedly have been sold and installed by the plumbers, had they been willing at all times to make a study of this business, instead of allowing departmental and furniture stores to usurp their rights and secure quite a large portion of the gas appliance trade.

There are at the present time over 1,000 uses to which gas is applied. This statement is not a result of guesswork, but an actual fact; each one of these uses could be enumerated did time and space permit.

This "tremendous" fact, probably unknown to the large majority of sanitary engineers, speaks for itself. With this enormous number of uses, which, by the way, are also steadily growing, as year by year the advantages of gas as a fuel and illuminant are becoming more apparent, and new inventions are being put on the market with new uses, there is no limit to the gas fitting and installation of appliances.

It is quite time that every sanitary engineer realized the fact that no building can be called either complete or up-to-date without it is piped throughout for gas, ready for the installation of the gas appliances which the object of the building demand.

This statement applies not only to the dwelling house, but to the hotel, factory, office building, garage; in fact, to every conceivable kind of structure. For each and every building there are gas appliances made, which are practically indispensable, and which only need demonstrating properly to the owner or occupant of the building to command a ready sale.

From the above facts it is easy to construe that "gas" is not out of date, that it has not outlived its sphere of usefulness; in a word, "gas" is still very necessary (together with its accompanying appliances), and becoming more so day by day. The sooner every plumber realizes this to be the case, the sooner will they get busy and gather the latest knowledge regarding gas piping, fitting and appliance installing, which will enable them to secure their share of this already large and still increasing business.

The sanitary engineer can help the good work along by pointing out to owners, architects and builders the necessity for piping all buildings and helping to disabuse their minds of the idea that "gas" is a dead letter. By doing this in a judicious manner and meeting with the success which their efforts in this direction can command, they will be building up a business for themselves and for future generations.

In most cases the sanitary engineer is looked upon in the same light as a doctor, the builders, etc., knowing how necessary good sanitation is, are willing, not only to listen to them, but to take their advice and act upon it. It is an easy matter for the plumber to add to his advice on good sanitation a timely word regarding the hygienic and healthful properties of a properly installed gas system, apart from the actual uses to which gas may be put.

Now a word or two regarding the choice of appliances by the sanitary engineer for demonstration to his prospective customers. To the man who wishes to be successful in selling and installing gas appliances, it is very necessary that he should be thoroughly familiar with the line he is handling, not only from an installing point of view, but as regards their efficiency, durability, consumption of gas, etc. He must also be in a position to demonstrate the way to use them and instruct the prospective customer in the care of them in order that the abuse and consequent short life of the appliance be avoided.

Each appliance before being chosen as the one which, of its particular kind, it is advisable for the plumber to carry, should be thoroughly examined and, if possible, tried out in order that its merits and demerits may be known. It is not a wise plan to adopt the sale of an appliance because it happens to be the cheapest, or because it is likely to show a larger margin of profit than a more expensive one. "Cheap articles are not always cheap." This remark applies very forcibly to gas appliances. As a rule, it is false economy to buy a cheap gas appliance, as in many instances it is short-lived. In many others the consumption of gas is too large, again in others it is impossible to repair. Appliances of this nature are not only unsatisfactory to the buyer, but likely to get the sanitary engineer installing them a bad name, and the Gas Company supplying the gas a certain amount of abuse which is undeserved.

On the other hand, an appliance thoroughly examined and tried by the sanitary engineer before recommending same to his customers, invariably brings an added reputation and recommendation which more than repays him for the care he has taken before advising the customer to purchase.

The best type of advertising is invariably attained by selling reliable appliances and installing them in a perfect manner, so that the customer gets the full benefit of the article he has purchased. This is the one sure method of building a business that will be lasting. Every reliable gas appliance sold, properly installed and demonstrated is a permanent advertisement to the sanitary engineer and a continual source of new business.

Another reason why every sanitary engineer should thoroughly understand

(Continued on page 19.)

Proposed Provincial Plumbing By-law

Being a By-law Proposed by the Ontario Society of Domestic, Sanitary and Heating Engineers, and Approved by Them. The Provincial Board of Health Have it Before Them for Further Consideration.

For Plumbing Construction and House Drainage.

JOINTS.

CLAUSE 68.—All joints between lead pipes and between lead and brass pipes, traps, ferrules or solder nipples shall be wiped joints. In no case shall bolt joints be allowed. All joints between iron and lead shall be made with brass solder nipples or ferrules.

CLAUSE 69.—All joints on cast iron pipes shall be made with oakum and lead thoroughly caulked and made gas and watertight.

CLAUSE 70.—All joints on wrought iron, steel or brass pipes shall be screwed joints made up with red lead paint or other suitable substance and be made gas and watertight.

CLAUSE 71.—All connections of lead pipe with cast iron pipe shall be made with a brass ferrule with an inside diameter not less than the outside diameter of the lead pipe to which it is attached and properly leaded and caulked into the hub of the cast iron pipe or fittings.

CLAUSE 72.—All ferrules shall be of cast brass at least 4½ inches long and free from sand holes and other defects.

CLAUSE 73.—Solder nipples shall be heavy cast brass, or heavy brass tube, iron pipe size.

CLAUSE 74.—No slip or washer joint shall be used as a connection to a soil or waste pipe on the sewer side of any trap or on any vent pipe.

CLAUSE 75.—Connections between earthenware or cast iron traps and lead bends shall be made by a heavy cast brass floor flange fastened to the floor and soldered to the opening of the lead bend and the joint made gas and watertight with a gasket of rubber or asbestos.

FIXTURES.

CLAUSE 76.—All fixtures other than water closets and urinals shall have strong metallic strainers or bars over the outlets to prevent obstruction of the waste pipes.

CLAUSE 77.—All fixtures shall be set free and open from all enclosing woodwork.

CLAUSE 78.—All fixtures must be constructed of non-absorbent materials. Wooden baths, washtubs, sinks and metal lined wooden fixtures are prohibited.

CLAUSE 79.—All receptacles used for water closets, urinals, or slop sinks shall be either vitrified earthenware or cast iron, white porcelain enamelled on the inside. If cast iron, they shall also be enamelled or coated on the outside with a non-absorbent and non-corrosive paint.

CLAUSE 80.—All water closets and urinals shall be fitted with either syphon discharge flush, pressure tank, automatic flushing valve or flushometers of approved type, and shall have a flushing capacity of not less than three gallons for water closets and not less than one gallon for urinals.

CLAUSE 81.—All water closets and urinals shall be provided with flushing rims so constructed as to flush the entire interior surface of the bowl and with such force as shall thoroughly cleanse the surface.

CLAUSE 82.—Range water closets, pan, valve, plunger, long-hopper washout, and other closets, all latrines, having invisible seals or the wall of which is not thoroughly washed at each discharge of water are prohibited.

CLAUSE 83.—Frost-proof closets may only be installed in compartments which have no direct connection with any building used for human habitation and on approval of the local Board.

CLAUSE 84.—All water closets, urinals and other plumbing fixtures shall be provided with a sufficient supply of water for flushing purposes to keep them in a proper sanitary condition.

CLAUSE 85.—No closet or other convenience which allows of the escape of gas or air from any of its parts or from the drain, soil or waste pipe connected with it, or which allows of any accumulation of filth in or about it, shall be fitted up or used.

WATER CLOSET AND URINAL COMPARTMENTS.

CLAUSE 86.—All water closet and urinal compartments shall be provided with light by a window in an external wall at least 2 square feet and which can be opened to the outer air. In cases where this is impossible, the compartment shall be provided with light in a partition of at least 2 square feet, or by artificial light.

CLAUSE 87.—No water closet or urinal shall be located in any sleeping compartment.

CLAUSE 88.—No water closet or urinal shall be placed in any cellar or basement unless such cellar or basement has a cement floor or other material impervious to moisture and is well lighted with natural or artificial light and has easy means of access.

CLAUSE 89.—The floors of all water closets and urinals in office buildings, public buildings, hotels and schools shall be constructed of materials impervious to moisture.

CLAUSE 90.—All water closets, urinals (and slop sinks when in a separate compartment) must be supplied with a local ventilation pipe having an area equal to a pipe 3 inches in diameter and connected to a heated flue. In compartments containing 3 or more such fixtures the size of the main ventilating pipe must be increased proportionately. When such local or main local vent pipes cannot be connected to a heated flue, they shall be extended through the roof and made weatherproof, and the outlet end proteeted by a cowl.

NUMBER OF WATER CLOSETS.

CLAUSE 91.—Every building used as a factory or workroom in which men and women are employed shall have separate and sufficient water closet accommodation provided for both males and females and be distinctly marked. One water closet shall be provided for every twenty females or less, and one water closet and one urinal for every twenty-five males or less.

CLAUSE 92.—In lodging houses or hotels there shall be provided one water closet for every twenty-five males or less, and one water closet for every twenty females or less. There shall be at least one closet on each floor for each sex.

CLAUSE 93.—In tenement houses there shall be at least one water closet for each family.

RAIN WATER LEADERS.

CLAUSE 94.—Rain water leaders inside any premises shall he constructed of cast iron, galvanized or asphalted wrought iron or steel pipes and made watertight. All rain water leaders shall be trapped before being connected to the house drain.

CLAUSE 95.—The pipes used for weeping or subsoil drainage shall be connected to a rain water leader drain, on the house side of the trap, and all drains used for such weeping and sub-

soil drainage of any building must connect to the main drain on the sewer side of house trap, and he so arranged that sewage will not pass or back into their trap.

CLAUSE 96.—No rain water leader shall be used as a soil or waste pipe and no soil or waste pipe shall he used as a rain water leader.

CLAUSE 97.—All surface drains shall he provided with deep seal traps.

BACKWATER VALVES.

CLAUSE 98.—Drain pipes from fixtures in cellars and basements liable to a hackwater flow from a sewer shall be supplied with a hackwater valve, of a design approved by the Provincial Board of Health. Gate or hackwater valves shall not be placed on any house drain or soil pipe in such a manner as to interfere with the proper ventilation of the plumbing and drainage system.

BOILER EXHAUSTS.

CLAUSE 99.—No steam exhaust pipe, boiler blow-off pipe, drip pipe or sediment cock of a hoiler shall discharge directly into any house drain or soil pipe. Such pipes shall connect to a condensing or cooling tank of proper dimensions and the discharge pipe from such tank shall be provided with a deep seal trap.

DRINKING FOUNTAINS.

CLAUSE 100. — Drinking fountains manufactured for this purpose, only placed on walls and pedestals may he connected to a rain water leader on building side of trap without having a separate trap or vent. But if connected to a house drain or soil pipe, they shall be considered a plumbing fixture, and shall be properly trapped and vented.

CLAUSE 101.—No safe waste, range boiler, vacuum cleaner, waste or cistern overflow shall be allowed to connect to any house drain or soil pipe, unless under unusual circumstances, and then only on the written approval of local Board of Health.

WATER STORAGE TANKS.

CLAUSE 102.—All tanks for the storage of water intended for drinking purposes shall be covered so as to exclude dust and dirt and shall be located so as to prevent the water from heing contaminated by gas or odors from fixtures.

FUTURE CONNECTIONS.

CLAUSE 103.—The plumbing and drainage system of all premises shall be maintained hy the owner at all times in good working order in conformity with these regulations, and to the satisfaction of the local Board of Health.

CLAUSE 104.—Whenever upon complaint made by any sanitary inspector, tenant, occupier or neighhour, the local Board of Health shall he of the opinion that a source of sickness or a nuisance dangerous to health exists in any building or premises, or that disease or sickness exists therein or are likely to result from a defective system of drainage or plumhing in such huilding or premises situated within the jurisdiction of the local Board, it shall be the duty of the local Board to cause the said building and premises to be inspected by the Plumhing Inspector, who shall immediately inspect the plumbing and drainage of the said huilding or premises and report the condition to the local Board.

CLAUSE 105.—The said local Board shall immediately after such inspection serve upon the owner, agent or person having charge of such huilding or premises, a copy of the Inspector's report, and shall by written notice require such owner, agent or person in charge to make all specified necessary repairs to the plumhing and drainage of said building or premises to the satisfaction of the local Board of Health within a time to be specified in such notice, and it shall thereupon he the duty of such owner, agent or person in charge of such building and premises to comply with such requirements of the local Board of Health.

CLAUSE 106.—No person shall damage or injure any common sewer, private drain or sewer connecting therewith and if any damage or injury has heen caused same shall be reported to the Plumbing Inspector and same shall be repaired to his satisfaction.

PENALTIES.

Any person or persons who shall fail to comply with any of the provisions of this Act regarding the procuring of a license or certificate to engage in or work at business of plumhing or house drainage, shall he liahle to a fine of not less than $10 (ten dollars) nor exceeding $50 (fifty dollars) for each and every day he or they may engage in such work without first having obtained said certificate or license, and any person or persons who shall violate any of the rules and requirements set forth in these regulations regarding the construction or alteration of any plumbing or house drainage, shall be liable for every such offence to a fine of not less than $10 (ten dollars) or more than $100 (one hundred dollars) or to imprisonment for 30 days, and on conviction, if a master plumber, in addition to the penalties herein described, he shall forfeit any certificate or registration he may hold with the Board of Health.

"GAS TALKS" TO SANITARY ENGINEERS.

(Continued from page 17.)

the gas appliances that he is handling is to obtain faith in them. By trying them out he will ohtain faith in their efficiency, their durahility, their economy, and having this faith, he can start to sell with confidence. The article is more than half sold if the seller has faith in it. He can sell twice as many hy being ahle to demonstrate and explain them with confidence; having learnt their merits hy experience, his words carry weight, which his prospective customers cannot hut notice. He takes more interest in the sale, and having succeeded, takes more pride in the installation.

In a recent issue of this journal a sanitary engineer, in writing to the editor, made use of the following words in referring to gas water heaters: "I have never installed very many, but business not being just as good as I would have liked it to be. I have taken a little more interest in gas water heating, and have installed a few of these heaters recently." This seems to have heen the case with quite a number of the trade. They only think of gas appliances when business is not as good as it might be. The probability is that if they would only give this branch of their trade the prominence it merits all the time, they would not have to complain regarding slackness of trade.

Thank goodness, this undoubted failing can be remedied, and the ever-increasing business in gas appliances still offers immense opportunities to every sanitary engineer who is willing to use a little energy and up-to-date methods to increase his trade and huild a business which will be a continual source of profit. It should he borne in mind, however, that in order to sell gas appliances the buildings must first be "piped," and that the piping installed must be adequate to meet the needs of every lighting fixture and gas appliance that may be installed in the future.

STEEL WIRE LIST.

W. N. Brunton & Son, steel wire manufacturers, Musselhurgh, Scotland, have issued a new steel wire list for steel wires, hardening and tempering. Copies will he mailed on request.

MAKING SHRAPNEL SHELL.

Among the many manufacturers of plumhing supplies, radiators and boilers, who have placed their plants at the disposal of the Imperial Government, are the Pease Foundry Co. They have recently been entrusted with the manufacture of 100,000 shells, and are installing more machinery to cope with the order.

THE SANITARY ENGINEER

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JOHN BAYNE MACLEAN - - *President*
J. G. LORRIMAN - - - *Manager*
EDWIN S. EWSOME - - - *Editor*

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JULY 15, 1915

Be Loyal to the Craft.

IN these days when business is not what it might be, there are those who are ready to take a job at a remarkably low price, with the hope of inducing the property owners to get improvements made.

This is a wrong policy and cannot be too strongly condemned. If a job is worth doing at all, it's worth doing right and no installation can be done right at too low a price. A case came to our notice not long ago where one sanitary engineer looked over an installation which required at least new fixtures.

Upon making a thorough examination of the piping, it was found to be in a very poor condition and required to be torn out.

A price was quoted and was found to be too high. The owner thought that it was a pure hold-up.

However, some time later the sanitary engineer happened to be in the vicinity, only to find that the plumbing had been done, and the people too.

No new piping had been installed, not even the water pipe was new, furthermore, not one of the fixtures had been vented, even though the plumbing by-law distinctly stated that all traps should be "properly and effectively vented." Now what is there to prevent a good square sanitary engineer from laying a charge before the proper authorities? If every sanitary engineer made it a point to report all defective systems to the plumbing inspector or Board of Health, it would result in great good. This should be done in every case, be the man who did the work a member of the same society or association or not. These personalities require to be cut out. Such botch work reflects on the whole craft. No work should be allowed to remain under such conditions, and he who does not report it is just as guilty, on principle, as the man who installed it.

Connecting Old Installations.

A QUESTION was put to the writer on his recent trip to the Maritime Provinces, as to the advisability of connecting old installations to a new system of main sewers. It seems that in a certain city we have in mind cesspools and old type septic tanks were the order of the day. Plumbing at one time was of a very poor order, and now that new main sewers are laid, the city authorities demand that all plumbing be connected to these new sewers.

This is all right so far as it goes, but the plumbing should be properly inspected, and a smoke test applied to every installation. Not only so, but all plumbing, we maintain, should be brought up to standard and made to conform with the latest by-law in operation in that town. To allow old systems of plumbing to be connected to a public sewer is not fair to those who are putting up new buildings and being compelled to install up-to-date plumbing. A person would be justified in raising objections if those who have poor, defective plumbing in an old house are allowed to connect their old system to the new. The point is this: When a town or city constructs a new system of main sewers, a plumbing by-law should be put into operation to meet the requirements of that town. All plumbing should be brought up to a standard which will conform to the plumbing by-law and should be connected to the main sewers. Another point to bear in mind, too, is that no main house trap be installed on the house drain to the main sewer. This trap being eliminated at the start the sewers will all be kept clean, and no such thing as sewer gas will ever trouble that town or city.

The Curse of the "Printer Pest."

WE have read time and time again of the evils of strong drink, and of various poisons, which, if used in a proper manner, may be of very great value to humanity at large (we could not do without them in fact), but, which if used in a careless manner, wreak ruin and disaster to both man and beast. Such argument may be used with reference to almost anything in existence, but the most contemptible thing in the world to-day is the poisoning of the people's mind.

The daily press to-day should be the most valuable influence for good in the world. Everyone reads the daily or local newspaper, and like the little child who looks to its parents to feed it, to mould its early thoughts and actions, the older people who buy and read their daily paper pin a great deal of faith to what they read and feel that there must be some truth in anything appearing in print. We ought to be able to accept all that we read as true, but unfortunately we cannot. The newspaper to-day is out to show up anything which smatters of scandal, and if there be some slight slip made by an individual, the newspaper will make a mountain out of a mole hill every time, particularly such papers as the Winnipeg Telegram. The average newspaper editor is nothing

more nor less than a surmiser. He puts evil thoughts into the minds of people; he can, and does, twist a statement into almost every shape imaginable; he can make a man say almost anything which he, the editor, wishes him to say.

The press, forsooth! The press, that mighty poisoner of minds and thoughts! That venomous thing, which could be the greatest good in this world! The freedom of the press! Which to-day is causing the downfall of many a good man because of some past mistake!

Let a man once make a slip, the people may forgive and forget, but the press never. If he ever aspires to prominence, his mistake will be placarded in 30-point type at least, and emblazoned throughout the length and breadth of the land. The Winnipeg Telegram is one of the latest to waste its space by publishing a silly cartoon describing the plumber as a "pest." We reproduce this cartoon on another page and we hope that the plumber or sanitary engineer in Winnipeg and surrounding districts will take notice and deal accordingly with that paper when it telephones for a "pest" to help it out of trouble. It is about time that "printer's ink" was used to better advantage, in assisting the Canadian sanitary engineers to clean out the riff-raff. There are scores of sanitary engineers who are trying to give the public a square deal and who wish to have by-laws put into force which would make it impossible for impractical men to engage in the sanitary and heating profession. But, the moment any move is made to improve conditions, the press cry out: "plumber's combine," "pests," and all such like trash. There are thousands of printers and publishers who have amassed great wealth within the last few years which goes to prove that there are greater profits in printing than plumbing. But how many plumbers are there who have become rich? Very few; which goes to prove that plumbers are public benefactors to a greater extent than printers of the Winnipeg Telegram type.

On the Fringe of Success

A RETAILER, who was just on the fringe of success, went out of business in a Canadian town a short time ago. He was a bright, energetic fellow who worked hard and who was a splendid salesman. He showed good windows, advertised occasionally in the local paper and was a man well known and well thought of about the town. He was indeed a man whom everybody believed was making a success of his life's work. Business appeared to be coming his way, and there was every prospect that in a few years' time, he would be listed among the successful merchants of that part of the country. But he had just one failing—at least, just one that presented itself on the surface very prominently when the business was being wound up. He was dilatory in the matter of getting in his money. It was a hard thing for him to say "no" to a credit applicant. And so when he failed his books were well filled up with accounts which had been running so long that it was almost out of the question to collect them. He went strenuously after business but not after the collections and so he failed on the fringe of prosperity. How many sanitary and heating engineers are there to-day that are troubled with the same weakness? It is a serious matter this not being strong-willed enough to say "No."

One thought which would be well to have in mind is this: "I can't afford to give out goods to someone else, if I owe for those goods, they are not mine to hand out, and when I give credit, I am distributing not only someone else's money, but also my own profit, which I have to depend upon to meet all my overhead expenses."

No class of business men have been so careless in giving credit than have the sanitary engineers, and for this reason, most jobbing shops have to send out a man to first do a job and then render the account afterwards. If it was a matter of simply handing out goods over a counter the matter could be easier remedied.

One thing should be done by every sanitary and heating engineer, and that is: render every account for jobbing work just as soon as the time and material has been charged and job completed. It matters not whether there is an arrangement for a term of credit, the invoice should be rendered for every job just as soon as completed. This waiting until the end of a month often results in some complaint or other being made and all kinds of excuses crop up which could have been easily remedied the moment the account had been rendered or received.

The Lien Law

AT the national convention held recently quite a discussion took place in connection with the lien law. Every sanitary and heating engineer should know something about the legal part of his business. He is risking his goods and his money to some extent wherever he contracts to do work or furnish material. He need not necessarily distrust his customer, but should protect himself against unforeseen circumstances which may occur. He *must* protect himself. We strongly advise that every one of our readers become versed in the various points in connection with the subject.

MODE OF ENFORCING LIENS.

It is not necessary to issue a writ of summons, but merely to file in the proper office a statement of the claim verified by affidavit.

Any number of lien holders having a claim on the same property may join in the action.

An action brought by any lien holder is deemed to be brought on behalf of all the other lien holders on the property in question.

In Ontario an action to enforce a lien may be tried by a Judge of the High Court, or by the Master in Ordinary, a Local Master of the High Court, an Official Referee, or a Judge of the County Court.

In British Columbia and Manitoba proceedings would be in the County Court.

In Alberta, Chap. 4, of 1909, provides that proceedings may be taken before the Judge in a summary way instead of by suit in the ordinary way. An appeal is allowed by the Supreme Court if the amount of the lien or combined lien is $200 or over.

In Saskatchewan and North-West Territories, proceedings are taken in the District Court, and in the Supreme and Territorial Court for the Yukon.

In New Brunswick the County Court has jurisdiction and in Nova Scotia, under $200, may be dealt with in County Court, over that amount the Supreme Court has authority.

New Sanitary and Heating Goods

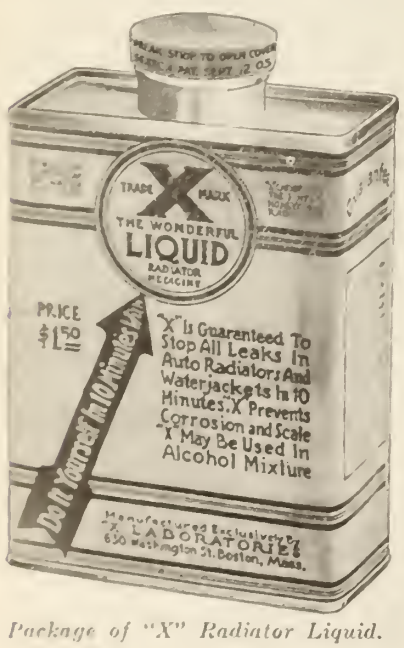
"X" RADIATOR LIQUID.

"X" Laboratories, 630 Washington Street, Boston, Mass., offer a new product to the Canadian trade called "X," the wonderful radiator medicine. The makers state that "X" will stop all leaks in auto radiators and waterjackets in ten minutes.

"X" is a liquid and contains no powder, cement or glue. The makers state that it is guaranteed to contain nothing injurious to metal or rubber, and it cannot clog even the finest honeycomb radiator. The makers also claim that when "X" is poured in the radiator it at once mixes with the water. "X" is claimed to reach the leaks, no water where located or how bad, and stops them. The makers claim that "X" can be used successfully for stopping leaks and cracks in steam and hot water house boilers, auto radiators, water-jackets, pump and connections, hot water radiators, and piping. It is also said to be good for stopping punctures in automobile and motorcycle inner tubes. Descriptive matter and instructions will be mailed on request.

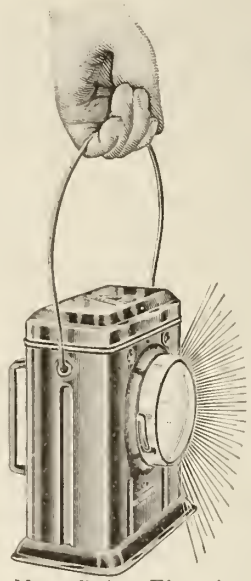
NEW DELTA ELECTRIC LANTERN.

The Delta electric lantern, which operates on two ordinary dry batteries, is



Package of "X" Radiator Liquid.

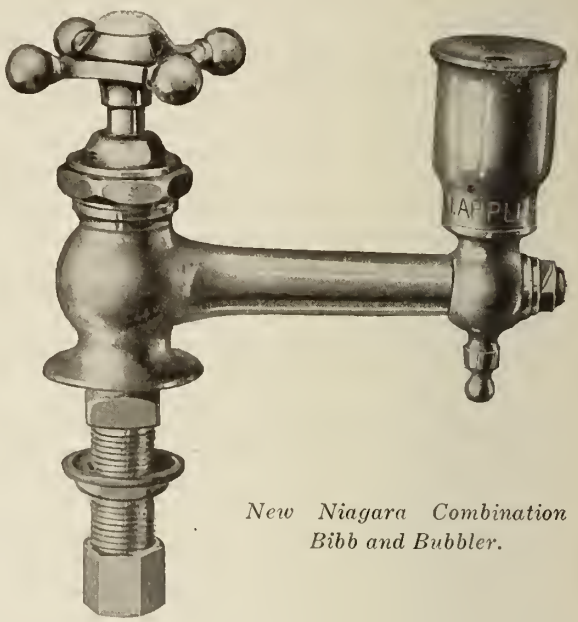
being announced by its manufacturers, the Delta Electric Company, Marion, Indiana. It is claimed by the Delta Electric Company that the new lantern will replace the oil lantern in service and durability. This claim is made on the basis that the lantern is made to throw a light through half a sphere, and that its rugged construction will permit of its being used in every place an oil lantern is used. The following specifications have been given: Case—Constructed out of heavy cold rolled sheet steel, formed and ribbed in a manner to give great strength with a minimum weight. Base—Flanged in the same way as the oil lantern, so that when the lantern is set down on hay or rough ground it will not upset. Handles—Has a heavy drop bail handle keyed to the battery case, so it cannot possibly come out when in use. The bail handle is large enough to receive the arm of a big man in a big overcoat. In addition to the bail handle, there is a grip handle, conveniently placed in the back. It can be folded back flush with the back of the lamp when not in use. Reflector—Drawn out of brass and ribbed in such a manner as to give a broad spreading light. It is heavily triple, silver-plated and polished to a mirror finish. Switch—Located in a protected place on the back of the lamp. It has German silver contact points, which are under firm spring tension. Bulb — High-grade, 3-volt Delta, hand-made, with a drawn tungsten wire filament. Finish—Thoroughly baked in a fine grade of gloss enamel. Trimmed in nickel-plate, highly polished. Lens—Convex-concave and made out of the finest lens glass.



New Delta Electric Lantern.

NIAGARA COMBINATION.

This is the day of specialties—specialties which give special service. Brass goods are bought to-day because of the service they can give. At one time nearly everything was sold according to the quality of material, finish and workmanship. To-day goods have to be made of the very best material, splendid finish, workmanship and design right, plus service. It is service that counts, and manufacturers of brass goods more than any other have realized the truth of our assertions.



New Niagara Combination Bibb and Bubbler.

The K. & S. Specialty Manufacturing and Sales Company, Cleveland, Ohio, have recently placed upon the Canadian market their Niagara combination bibb and bubbling fountain. By simply reversing the cup, the bibb is brought into action, and vice-versa when the drinking fountain feature is required. The manufacturers will be pleased to mail further particulars upon application to above address.

It is said that a man falling overboard from a destroyer going at full speed almost invariably breaks his neck. When it is considered that his body at the moment of striking the water would be travelling with a horizontal velocity relative to the water of from 50 ft. to 60 ft. per second, it is not difficult to understand that something of the sort might occur.

Sanitary Methods of Sewage Disposal

This Series Will Deal With the Sanitary Methods of Sewage Disposal in Rural Districts, Where There are no Drainage Systems—Even Large Cities are Realizing That Sewers and Drainage Systems are not by any Means Disposal Systems.

IN the last article upon this subject which appeared in March 15 issue, we described a system of irrigation pipes which could be laid on a hillside, by the use of a special tile fitting. Figs. 1 and 2 in this article show another very simple method for the same purpose. Fig. 1 shows a perspective view of a single system of sub-surface irrigation tile piping with one main pipe from the septic tank. It will be noted that the sewage must fill the first line of laterals up to the first bend on the opposite side of the main, the sewage then fills the next line of field tiles until it reaches the second bend on the left, and so on until all have been filled.

Fig. 2 shows the elevation plan of a double system of piping, the principle involved is just the same, except that, where the earth is rather inclined to be clayey, a double bed would be a great advantage. The idea is that by closing valve No. 1 and opening valve No. 2, one day's discharge of sewage could be diverted into the tile system on that side, and then by reversing the action, bed No. 1 would receive the following day's discharge.

The next important feature is that of furnishing sufficient open jointed field tile, and a proper size of septic tank. We have a case in mind where a scientist stated that one foot of 4-inch field tile pipe was sufficient to take care of one gallon of sewage. Such, however, is far from correct. Then we have known of some professors advocating a septic tank so large as to allow 30 gallons of fluid per person residing and using the septic tank, this latter, too, is not good practice. Of course, it may be argued that a person residing in a town or city where a public water works is in operation would use even as high as 40 gallons, but we do not for one moment think that such would be the case where every drop of water has to be furnished by either a hand pump and attic tank or an electric pneumatic water system.

As a result of years of experience we have found that from 15 to 18 gallons per 24 hours per person, would be ample. Therefore when constructing a septic tank it will be seen that three cubic feet per person would suffice. This being the case, the next step would be to determine the quantity of pipe to furnish.

This is a very important matter and is explained in this way. Suppose a septic tank will discharge say 20 cubic feet of sewage at one flushing, that operation should entirely empty that portion of the tank called the dosing chamber. If there is not sufficient cubic area of empty pipes to take care of the whole discharge then of course the whole quantity cannot leave the dosing chamber and the result will be that some of the bacteria which are properly cultivated and ready for discharging will still remain in the tank and become mixed with other germs. Not only so but if the tank were fitted with a syphon, the syphonic action would be disturbed. Both legs of the syphon would be full for a short period and only part of the contents would be discharged. This would mean that the total capacity of the dosing chamber would be reduced. The capacity of the dosing chamber would have to be based upon the capacity of the pipes laid in the absorption bed.

If a Quinn valve be fitted to a tank where there are not sufficient pipes furnished in the bed, the result would be as follows: The tank becoming filled the ball would release the bell, this would rise and open the valve, the bell would remain up so long as there was fluid in the chamber to hold it up, and as the fluid lowered, the valve would slowly lower. Then as the dosing chamber filled of course the fluid would again

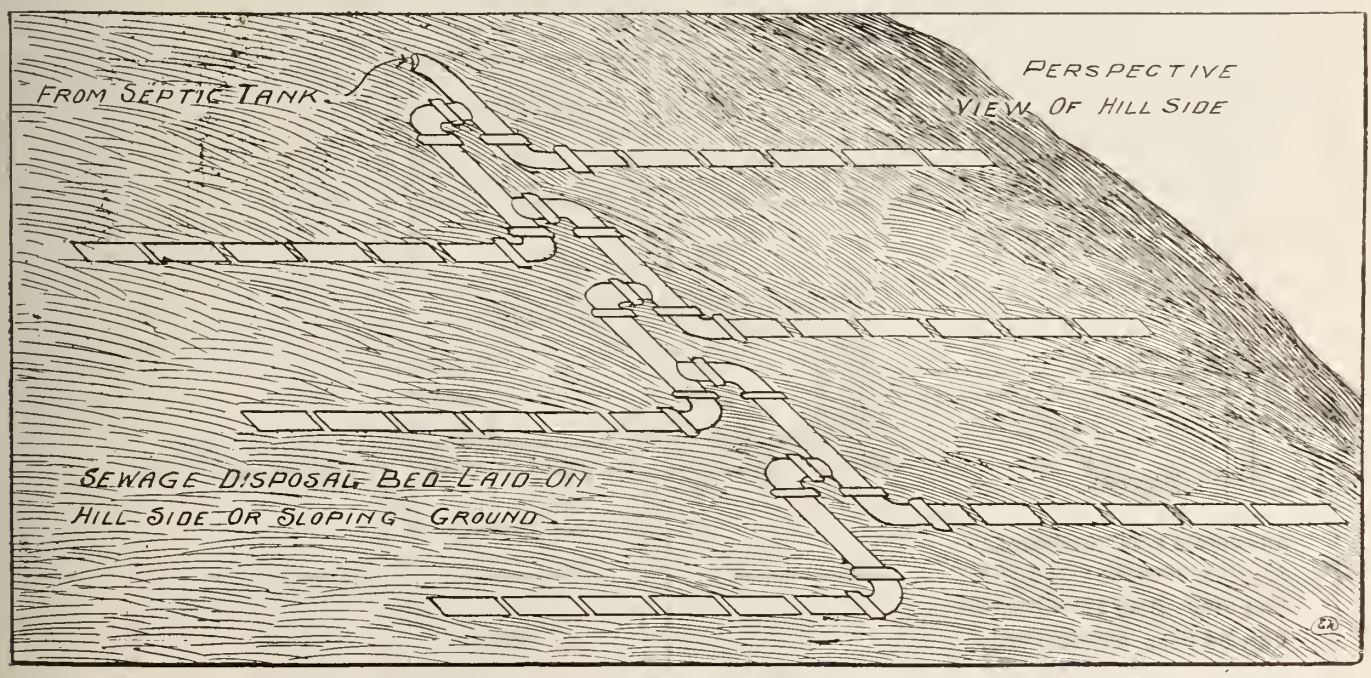
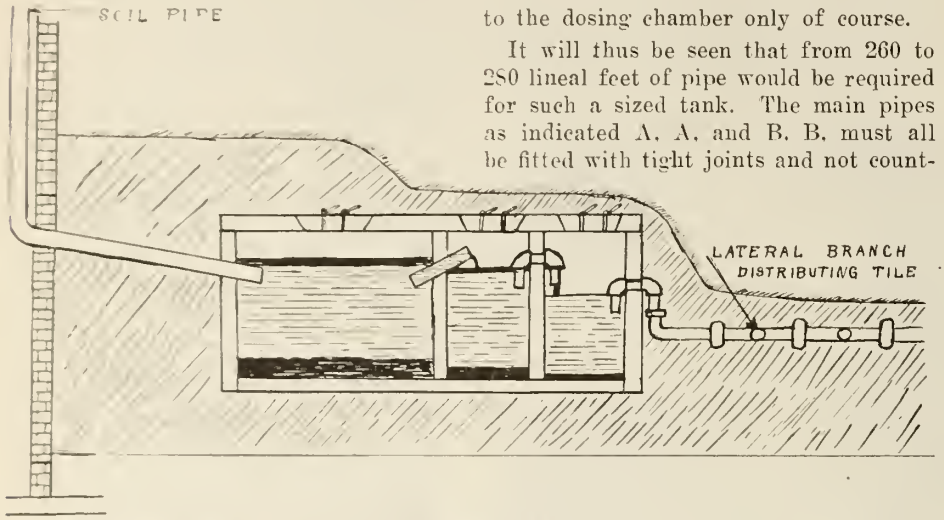


Fig. 1—Perspective view of single piped sewage disposal bed on hillside. Elevation of ground no objection.

operate the ball. But all this as can be plainly seen would reduce the capacity of the dosing chamber to the capacity of the piping laid in the bed.

Both the conditions named would cause the dosing chamber to discharge the fluid too often and keep the pipes working too much. The ground would tire, and get water-logged as it were.



A septic tank which could not possibly give satisfaction. No sewage should be allowed to discharge in any other way but intermittently. The great trouble with such a tank is that the danger is not apparent until it has been installed for some time.

It can be plainly seen that it is very essential to have lots of pipes laid in the absorption bed. Of course this can be overdone, and would result in the earth freezing because of there not being sufficient germ-laden fluid discharged into the pipes. It is the active bacteria which prevent these pipes from freezing, and such a condition can be established by there being too small a quantity of piping, thus choking the pipes too full, the same as would happen if there were too many pipes and not sufficient germ-laden fluid entering into them to keep them sufficiently active.

If, as we stated before, a septic tank will discharge 20 cubic feet of sewage, it will be necessary to furnish 13 to 14 lineal feet of 4-inch field tile to each cubic foot of tank contents. We refer to the dosing chamber only of course.

It will thus be seen that from 260 to 280 lineal feet of pipe would be required for such a sized tank. The main pipes as indicated A, A, and B, B, must all be fitted with tight joints and not counted in the afore-named quantity of lineal feet.

WHEN A HOUSE IS CLOSED FOR THE SUMMER OR WINTER.

How many of the trade go round to their customers and tell them that no house should be closed up in the summer without first calling in a sanitary engineer to see that all water pipes are turned off, all traps drained, and a non-evaporating fluid poured into all traps. Many a house has been filled with foul odors from the house drain and sewer because of the water in the traps evaporating. There is money in every job for the sanitary engineer. No house should be closed up either winter or summer until all the water from traps has been emptied out and coal oil poured into them. How many traps have frozen and burst because of failure to carry out the above advice? Thousands we would say, and it is only a matter of an hour or two to each house.

The writer was in a house the other day where a main house trap was installed. The seals in all the traps were broken including the main house trap, and a quantity of excreta was found deposited in the bottom of the trap. The stench was something fearful, simply because the trap had prevented the excreta from discharging direct into the main sewer, and when the seals of each trap became broken by evaporation of the water the atmosphere in the house naturally became polluted. This was experienced when on a house hunting trip, so we would advise every sanitary engineer to make a point of watching every empty house these times, and thus find himself a job.

The sharp tongue is a weapon that is always loaded, and is often more dangerous to the owner than to the target.

* * *

The most potent factor against success is discouragement. The man who becomes discouraged has already lost half the battle of life.

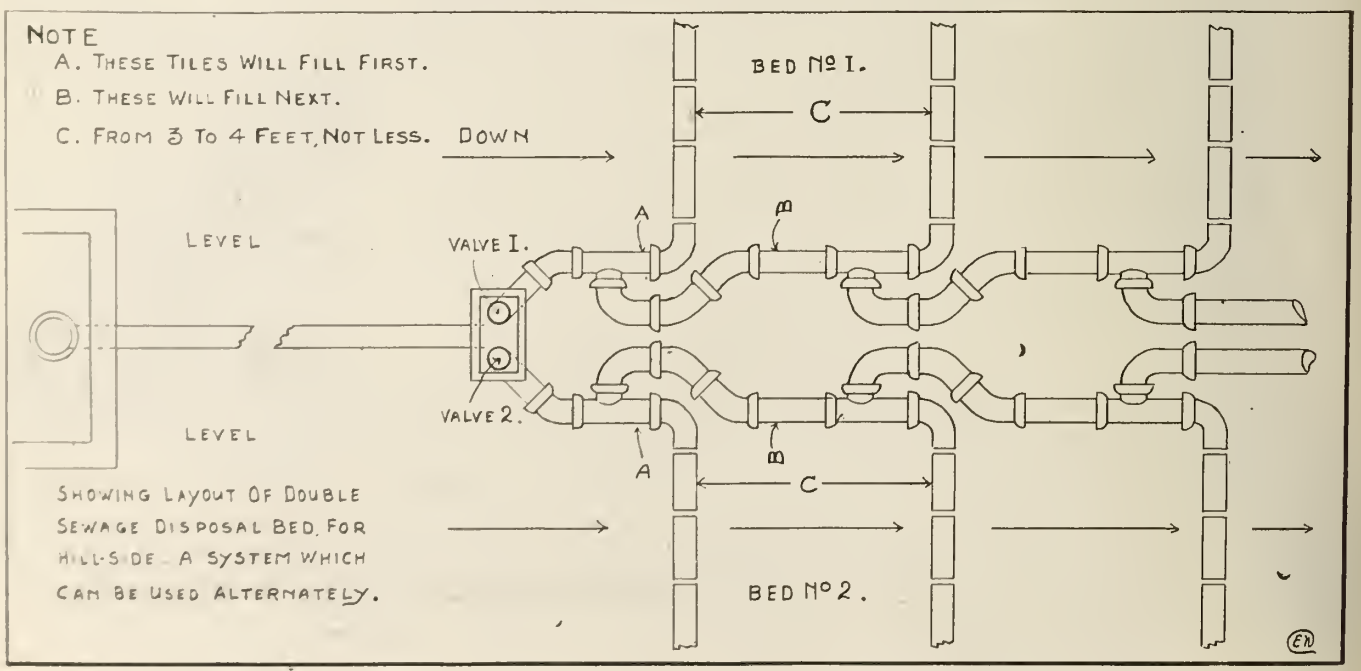


Fig. 2.—Plan of piping for sewage disposal bed which can be laid on a hillside. Elevation of ground no objection.

Practical Course for Sheet Metal Workers

ARTICLE No. 18 OF SERIES

By CHARLES SEIVERS

THE problems shown in this are practically the same as the one treating a square and angle elbow. The section of pipe as shown at A in Fig. 1 being an elliptical curve. However, the method of obtaining the raise for the different pieces remains the same. The particular point to keep in view is that to carry the short axis as, "A-B," around the quarter circle to form the elbow. The axis A-B is the radius of the quarter circle drawn, from which to derive the raise required as shown at B in Fig. 1. To carry the longer axis around a quarter or part of it, the axis C-D is the radius of the quarter circle or part of it, from which to obtain the required raise, as shown at B in Fig. 2. Proceeding with Fig. 1, and having obtained the raise required as, B-D at B, set out the line A-B as shown at C, Fig. 1, equal to A-B, the short axis of section at A. At right angles to B, set off B-D the raise required, join D-A. Parallel to A-B and at a convenient distance draw another line as shown by 1-11. On this line set off a half of the section shown at A. Divide the half section into a number of equal parts, as shown by the figures 1, 2, 3, etc., and draw lines at right angles to A-B from each of these divisions, extending them to join the line D-A.

Now draw two parallel lines as shown at E-E and F-F. Then draw a line at one end at right-angles, joining them as described at 1-1. On each of these lines from 1, set off the division on the half section from 1 to 11, and repeat to make circumference of section complete. The next step will be to join these points by connecting 2 to 2 and 3 to 3, etc.

Working from the line 11-1 at C, measure the distance on each of the lines, to where they join the line A-D, and set off on lines of corresponding number on pattern, that is, on line from point 1, on lines 1, from points 2, 3, 4, etc., on lines numbered 2, 3, 4, etc.

When all have been marked off, draw a line through the point obtained which will outline first section of pattern. With this piece the balance of the elbow can be marked out. On the two outer lines 1-1, mark off A-D, which is the raise of the one-piece, then D-H, which is the width of the section at the throat of elbow, H-K, being the raise of one-piece, lay the first section when cut out, over the upper part of layout keeping the point A and K even, and when even, scribe around with pencil.

To mark next piece mark off K-L, equal to H-D or width of each section in the throat, lay the first section on lower part of pattern, keeping the points A and L even and when even, scribe around. The balance of layout forms, the fourth piece of pattern. The method of working out Fig. 2, is the same as described for Fig. 1.

Torpedo Balance Chamber. — The mechanism that determines the depth at which a torpedo runs is regulated first by a swinging pendulum and secondly by a valve kept in place by a spring, but which is forced in by the pressure of the water whenever the topedo sinks lower than a certain depth. The valve can be adjusted to any depth by the spring. Both pendulum and valve are connected to the horizontal rudders outside the torpedo.

PLATE 18

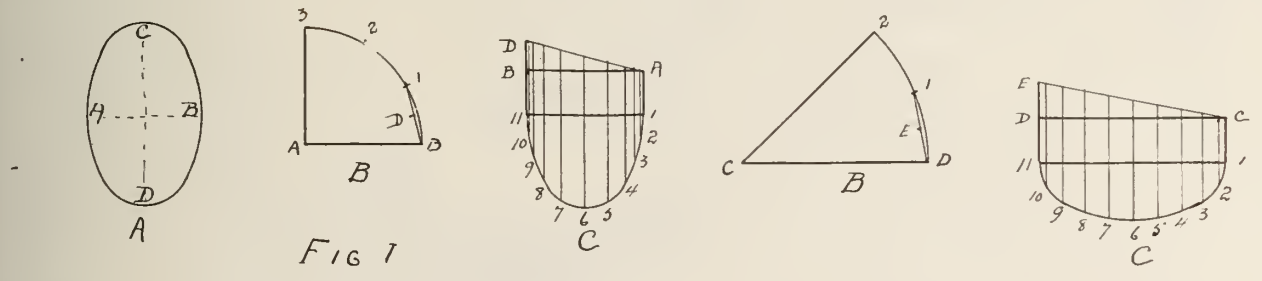
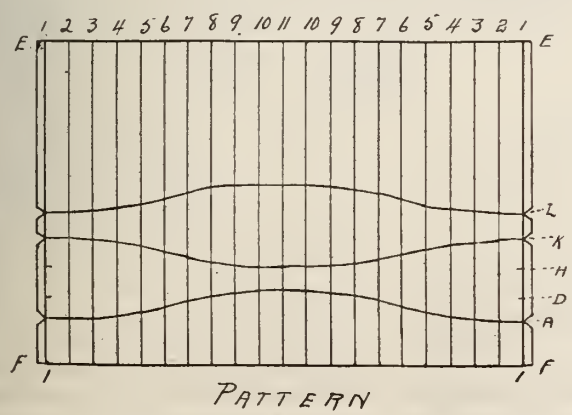
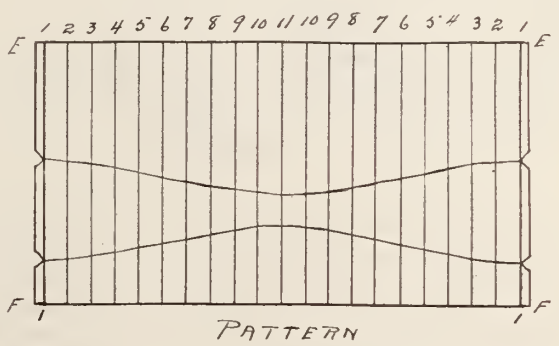


FIG 1

FIG. 2.





Radiator Traps and Test Data

Showing How the Efficiency of Radiator Traps is Determined — Every Sanitary Heating Engineer Should Know, When Buying Radiator Specialties, the Reasons for Purchasing and How to Choose Them.

*By L. M. Arkley, M.Sc.

THE primary object of a steam trap is to actuate a valve in such a way as to permit all water or condensed steam to flow quietly out of the radiator and at the same time, to allow none of the steam to escape with it. It will be seen that, to keep the radiator well cleared of water, the valve must operate very often. It is therefore subject to more or less wear. In the main, two general principles are employed, namely, the float and the thermostat. In the float type the valve is simply part of a hollow vessel and is lifted and opened by the water collecting under it. When this water runs away the valve, of course settles to its seat.

The thermostatic valve is actuated by the contraction and expansion of metals or gases due to heat. When the thermostat is surrounded by water, it is naturally cooler than when in contact with steam with the result that the element shortens and opens the valve.

Fig. 1 illustrates the common method of using radiator traps in connection with a vacuum heating system. Live steam from the boilers is used to drive the engine indicated at A. Exhaust steam from the engine is taken to the feed water heater B where approximately 1-7 of the heat units in it may be used to heat the feed water for the boilers from a temperature of say, 50 degs. to 210 degs. F., and the remaining 6-7 will thus be available for the heating system. This exhaust steam at low pressure is led directly to the radiators, and a vacuum is pumped on the return lines of the system by the vacuum pump C. The pump discharges the condensed steam into the tank D, from which it flows by gravity to the feed water heater B. After being heated to the temperature of 210 degs. or 212 degs. F. in the heater, it completes the circuit by being returned to the boilers by the feed pump.

In a heating system of this kind we might operate the plant with a steam pressure of from 0 to 5 pounds per sq. inch on the pipe F, and with a vacuum of from 8 to 10 inches on the return line, these values of course depending on the number of square feet of heating surface being supplied and the distance the steam has to be carried.

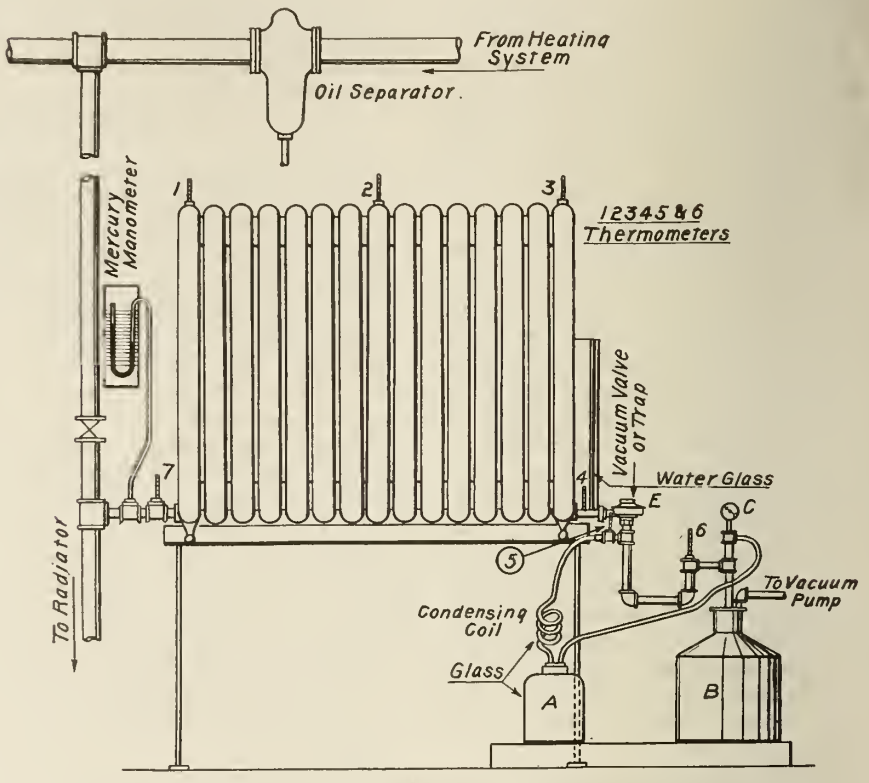


FIG. 2. ARRANGEMENT OF APPARATUS AS SET-UP FOR TESTING RADIATOR TRAPS.

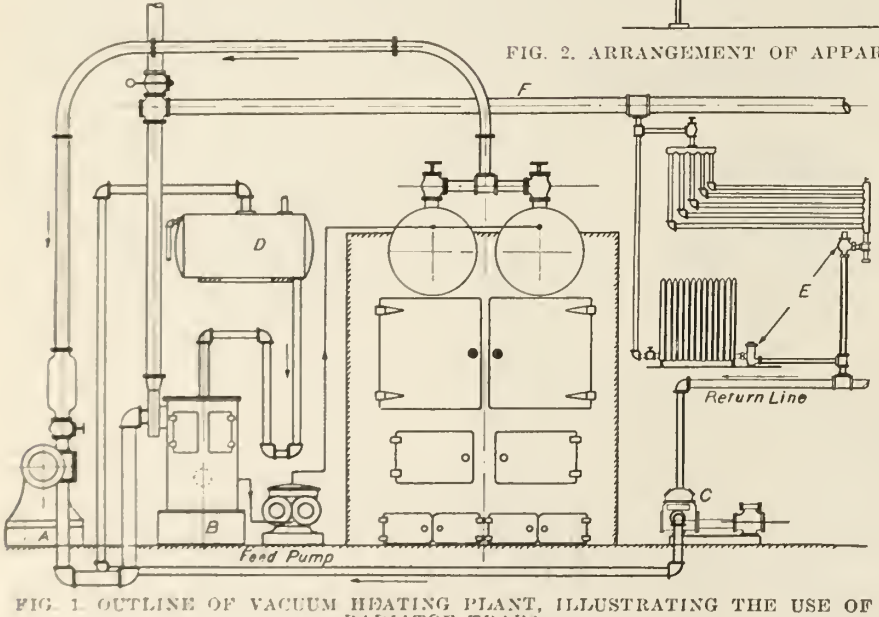


FIG. 1. OUTLINE OF VACUUM HEATING PLANT, ILLUSTRATING THE USE OF RADIATOR TRAPS.

*Lecturer in Mechanical Engineering, University of Toronto.

It is clear that under these conditions steam would blow through the radiator without being condensed and giving up its latent heat, unless some provision was

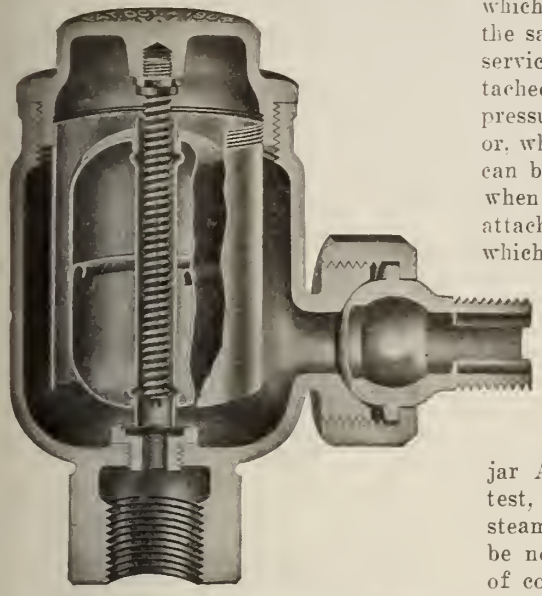


FIG. 3. WEBSTER WATER SEAL MOTOR TRAP—FLOAT TYPE.

made to prevent it. To stop this waste of steam, traps are placed on the return ends of the radiators as shown at E.

In order to test the comparative efficiencies of several well-known makes

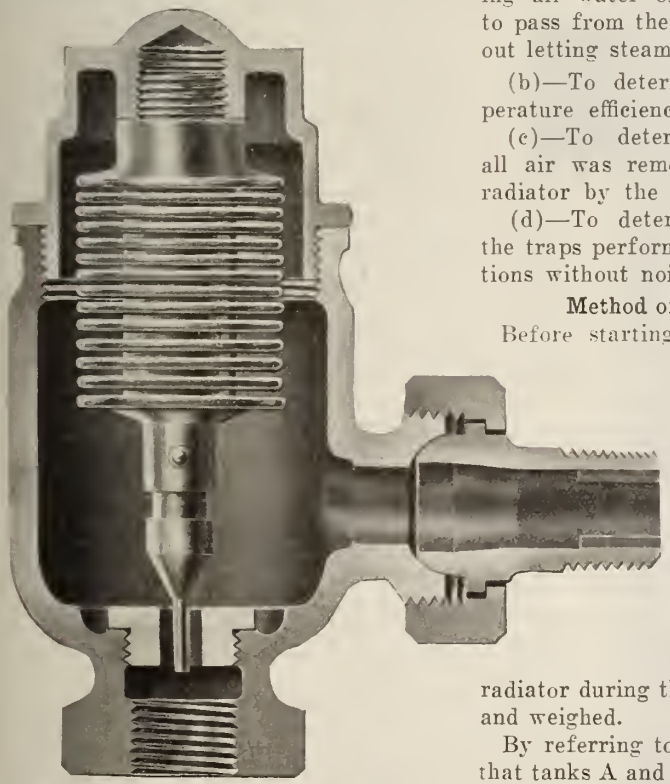


FIG. 4. WEBSTER SYLPHON TRAP—THERMOSTATIC TYPE.

of radiator traps the apparatus shown in Fig. 2 was fitted up in the Thermodynamic Laboratory of the University of Toronto.

Description of Apparatus.

The apparatus consists essentially of a standard type of radiator having 60 square feet of radiating surface and which is connected to the steam pipes in the same way as when set up for actual service. A mercury manometer is attached to the inlet pipe to register the pressure of the steam entering the radiator, while a thermometer in the same pipe can be used to indicate the temperature when desired. To the outlet pipe is attached a radiator trap E, a tank B, in which is collected the condensed steam from the radiator, a glass condensing coil, and a glass jar A, which condenses and collects any steam that may pass the trap.

There is an advantage in having the condensing coil and jar A of glass, as, during the test, the rate at which the steam is passing the trap may be noted and the completeness of condensation verified. The desired vacuum was indicated on gauge C, and was obtained by connection the apparatus to a vacuum pump as shown.

Object of Test.

(a)—To determine whether the traps performed their main function, namely, that of allowing all water of condensation to pass from the radiator without letting steam pass as well.

(b)—To determine the temperature efficiency of radiator.

(c)—To determine whether all air was removed from the radiator by the trap.

(d)—To determine whether the traps performed their functions without noise.

Method of Making Tests.

Before starting the tests, steam was turned on the radiator and the system allowed to heat up to its normal working condition; after this, readings of temperatures and pressures were taken at intervals of ten minutes for a period of two hours. If any water had collected in the radiator during the test it was drawn off and weighed.

By referring to Fig. 2, it will be seen that tanks A and B are so connected that they are always under the same vacuum or pressure, the water-leg preventing steam from passing to the tank B, therefore, if any steam passes the trap, it will find its way to the condensing coil and from there to the tank A. The weight of water in B represents the steam condensed in the radiator, while the water in A, after the proper correction has been made, represents the steam that has passed the trap.

Method of Computing Results.

In order to get the true value of the steam passing the trap a correction must be made to the quantity caught in tank A, because a certain amount of the water in the radiator which would remain as water while under the pressure in radiator would burst into steam after passing to the lower pressure beyond the trap. The following method will give a close approximation to what this correction should be:

Let A = the number of pounds of water caught in tank A.

Let B = the number of pounds of water caught in tank B.

Let r = the heat of vaporization of one pound of saturated steam under vacuum.

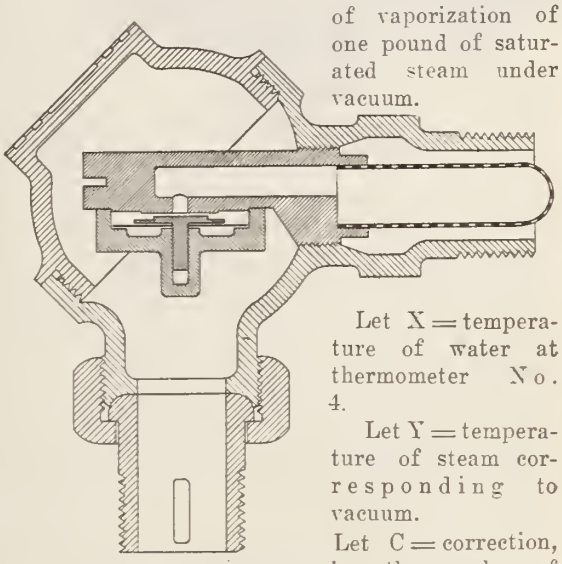


FIG. 5. D.G.C. TRAP—DIFFERENCE IN PRESSURE TYPE.

Let X = temperature of water at thermometer No. 4.

Let Y = temperature of steam corresponding to vacuum.

Let C = correction, i.e., the number of pounds of water to be deducted from A.

Let E = net weight of steam passing trap.

Then $C = \frac{(X-Y)}{r} \times B$ and $E = A - C$.

The above correction, while not exact, is quite close enough for practical purposes, and as it has been applied to each valve tested, the comparison should be fair.

The temperature efficiency of the radiator is defined as the average temperature of the radiator divided by the temperature of saturated steam corresponding to the pressure in the radiator. The temperature efficiency gives a very good indication of the quantity of air being trapped and held in the radiator sections. For instance, if the temperatures as read from thermometers 1, 2 and 3, Fig. 2, are nearly equal, and not far below that corresponding to the steam pressure, it shows that steam is filling each section and therefore air must be absent. In the following tabulation the first test is given complete; in the others,

only the minimum, maximum and average values are given for the pressures and temperatures, and the final results. Particulars of the traps tested are as follows:

Webster Water Seal Motor.

This trap, Fig. 3, operates on the float principle. As shown in the figure, it

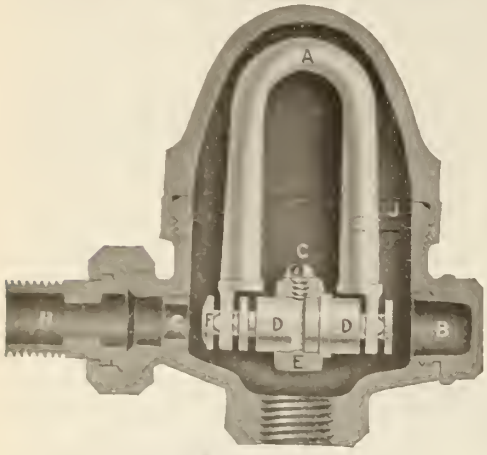


FIG. 6. HAINS OR "VENTO" TRAP—THERMOSTATIC TYPE.

consists of a metal shell in which a float fits loosely. The float is made of pressed steel with a hollow tube passing through its centre, a spiral screw fastened to the valve cover serving as a guide for the float. The air discharge is down through the hollow tube in the float which connects directly with the return line. When the water (which will rise higher in the valve than in the radiator due to the vacuum) reaches a certain height, the float rises and allows the water to be discharged.

Webster Sylphon Trap.

This trap, shown in Fig. 4, operates on the thermostatic principle. Most traps which depend for their action on this principle, have an expanding member, one end of which is fixed firmly to the cover of the valve chamber while the other end carries the valve. This expanding member is usually hollow and contains a volatile fluid which readily changes to the form of gas when its

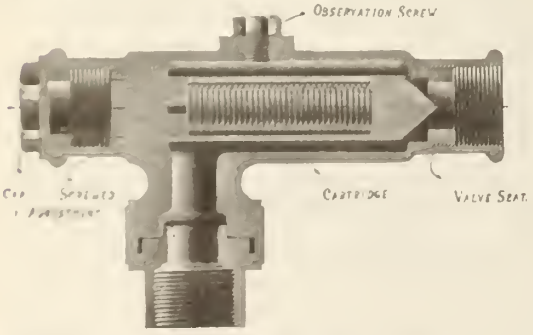


FIG. 7. THE "WELO" RADIATOR TRAP—THERMOSTATIC TYPE.

temperature is slightly increased. Suppose the valve in the trap closed. Water will begin to accumulate and its temperature will fall slightly. This drop in temperature causes the expanding member to contract which opens the valve to discharge water. As the water flows out, it becomes warmer and this allows the valve to close slightly and reduces the flow.

As shown by the results of these tests, a radiator trap made on this principle may be adjusted to work very satisfactorily. By referring to Fig. 4, it will be seen that the expanding member in the Webster Sylphon Trap is a hollow brass spiral coil one end of which is attached to the cover and the other to the valve stem. The body of the valve is of cast iron and the valve and stem of brass. The valve itself is cone shaped.

D. G. C. Trap.

This trap, a section of which is shown in Fig. 5, operates on a different principle from any thus far described. The steam passing through the screen at the right of the figure, reaches the rectangular chamber adjacent. A small, circular opening connects this chamber with the valve chamber directly below, and,

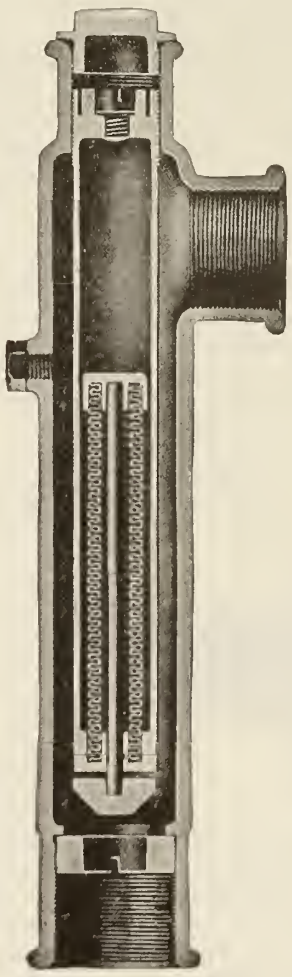
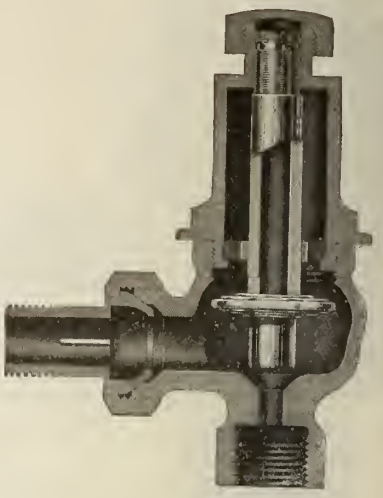


FIG. 8. SARCO STEAM TRAP—THERMOSTATIC TYPE.

through this opening, all water and air must pass.

The valve consists of a small circular disc of brass with a stem attached to the under side to act as a guide. If steam passes through this small orifice, its velocity is increased, and this high velocity steam blowing down on top of the valve



F$G. 9. MARSH REFLEX TRAP—THERMOSTATIC TYPE.

disc, creates an area of low pressure above it. The disc rises and closes the opening as soon as the pressure under it becomes greater than that above it.

Hains or "Vento" Trap.

A cross section of this trap is shown in Fig. 6. The operating member which closes or opens the valve is a U tube which is hollow, and is filled with a volatile fluid. When the pressure in the tube increases, due to the increase in temperature, the prongs of the tube spread and close the valve. When the temperature falls, the prongs come together and thus open the valve. The body of the trap is of cast iron while the U tube and valve are of brass.

"Welo" Radiator Trap.

This trap is shown in cross section in Fig. 7. It also operates on the thermostatic principle. The receptacle for the expansive fluid is a corrugated copper tube and, to this tube or cartridge is attached the valve. If steam comes in contact with the corrugated tube, it expands until the valve is closed. When sufficient water has collected to reduce the temperature slightly, the valve opens to discharge the water and air. The corrugated tube is of copper and the rest of the trap is made of brass.

No. 8 Sarco Steam Trap.

By referring to Fig. 8, it will be seen that this trap is in form very much like the "Welo," which has just been described and that it also works on the thermostatic principle. The main difference is that, in this trap, the expansive fluid surrounds the corrugated tube to which the valve is attached and is not within the tube as in the case of the "Welo." The body of the "Sarco"

trap is of steel and the expansion member is made of copper.

"Marsh" Feflex Trap.

As seen from Fig. 9, this trap operates on the thermostatic principle, the hollow corrugated disc containing the expansive fluid is inserted between the valve and a hollow stem fixed to the top of the cover. The action is the same as in

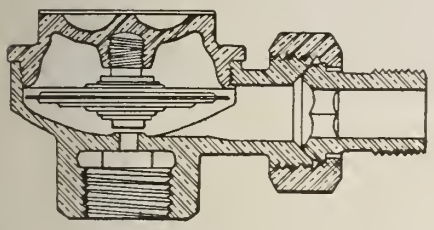


FIG. 10. DUNHAM NO. 1 RADIATOR TRAP —THERMOSTATIC TYPE.

other types of thermostatic valve described.

"Dunham" No. 1 Radiator Trap.

From Fig. 10 the method of operation of this trap is clear. The expansion member is a hollow corrugated disc which contains the volatile fluid. One side of this disc is fastened to the cover, while the other side carries the valve. A slight variation of temperature inside the trap will cause the valve to open or close. The hollow disc is made of copper and the body of the trap of brass.

Purpose of Tests.

These tests were made primarily for the purpose of satisfying the writer as to the value of radiator traps which he has had occasion to specify at different times in connection with the design of low pressure heating systems. Numerous inquiries along this line from architects and heating engineers would indicate that the question is a live one with all men directly interested, and seems to justify the publication of the results of this somewhat exhaustive test.

It must be remembered that there are other important features connected with radiator traps which cannot be decided by laboratory tests, for example, mechanical construction on which depends the life of the valve and its seat. The lift of the valve from its seat and the shape of both valve and seat determine its likelihood to clog on account of scale or dirt coming from the radiator. The ease with which the traps may be cleaned and kept in running order is also a very important feature. Mechanical knowledge and good judgment on the part of the purchaser should enable him to choose the best trap from a mechanical standpoint, but the length of life and other such questions can only be determined by comparing the action of traps operating over long periods of time under similar conditions.

The writer wishes to acknowledge suggestions and help given by Professor R. W. Angus, of the Department of Mechanical Engineering of the University of Toronto, and also the hearty co-operation of the manufacturers who furnished the traps tested.

Etching Glass.—Coat the glass with melted candle-grease, and draw the pattern to be etched in the wax with a sharp needle point. Next expose the glass to the action of vapor of hydrofluoric acid, generated by acting on flourspar with hydrochloric acid, and gently warm. The gas must be generated in a lead vessel, as it attacks most substances. It is very poisonous, and therefore care must be taken not to inhale it.

A fussy man reminds us of a camel; always going around with his back up.

* * *

Love thy neighbor as thyself, but don't cut down the hedge between you.

LOG SHEET OF COMPLETE DATA TAKEN IN LEADING TEST NO. 1.

Time p.m.	Steam pressure inches of mercury	Vacuum inches	Temperatures in Degrees F. 1	2	3	4	5	6
2.48								
2.50	2.2	10.0	214.0	214.5	214.0	214.0	187.0	190.0
3.00	2.2	10.0	214.0	214.5	214.0	214.0	189.0	192.0
3.10	2.2	10.0	214.0	214.5	214.0	214.5	190.0	192.0
3.20	2.1	10.0	213.5	214.5	214.0	215.0	191.0	193.0
3.30	2.1	9.5	213.5	214.5	214.0	214.5	190.0	192.0
3.40	2.1	10.0	213.5	214.5	214.0	214.5	191.0	193.0
3.55	2.1	10.0	213.5	214.5	214.0	214.0	189.0	191.0
4.05	2.1	10.0	214.0	214.5	214.0	214.5	190.0	191.5
4.15	2.4	10.0	214.5	215.0	214.0	215.0	190.0	192.0
4.25	2.5	10.0	214.0	215.0	214.5	215.0	190.0	193.0
4.35	2.5	10.0	214.0	215.0	214.5	215.0	190.5	193.0
4.45	2.5	9.5	214.0	215.0	214.5	215.0	191.0	193.0
4.48	2.5	10.0	214.0	215.0	214.5	215.0	191.0	193.0
Average values	2.27	9.9	213.9	214.6	214.1	214.6	190.0	192.0

Total period of test = 2 hours.
Average temperature of radiator ..... =214.2
Temperature corresponding to pressure in radiator ..... =215.6
Temperature efficiency of radiator ..... = 99.3
Name of Trap.....Webster Water seal motor.

Steam condensed in radiator ..... = 38.5 lbs.
Steam passed by trap ..... = 0.61 lbs.=1.58%
No air or water collected in radiator.
Operation of trap noiseless.

LOG SHEET OF DATA—FOR TESTS 2 TO 9.

No. of test	Values given	Time	Pressure inches of mercury	Vacuum ins.	Temperatures 1	2	3	4	5	6	Room	Name and type of trap	Aver. temp. of radiator	Temp. efficiency of radiator	Steam condensed in radiator	Lbs. of steam passed by trap	% of steam passed by trap
2	Min.	10.11	2.7	9.0	214.0	215.0	213.0	212.0	182.0	180.0	100.0	*Webster	....	....	....	....	....
	Max.	to	3.8	9.0	216.0	217.0	215.5	215.0	191.0	187.0	106.0	Sylphon	....	....	....	....	....
	Aver.	12.11	3.05	9.0	215.0	215.6	214.4	213.8	188.5	185.0	102.0	Trap	215.0	99.1	38.5	0.00	....
4	Min.	10.40	2.70	9.0	214.0	215.0	214.5	215.0	183.0	190.0	....	*D. G. C.	....	....	....	....	....
	Max.	to	3.10	10.5	215.0	216.0	215.0	216.0	194.0	198.0	....	Disc	....	....	....	....	....
	Aver.	12.40	2.92	9.6	214.6	215.5	215.0	215.7	190.6	194.0	....	Trap	215.0	99.2	43.5	0.54	1.22
5	Min.	20.8	2.70	10.0	213.5	214.5	214.0	214.5	189.0	192.0	98.0	*"Vento"	....	....	....	....	....
	Max.	to	3.30	10.0	215.0	215.0	215.0	215.0	190.0	193.0	110.0	Ther'static	....	....	....	....	....
	Aver.	40.8	2.96	10.0	214.0	215.0	214.2	215.2	189.7	192.4	107.0	Trap	214.4	98.94	46.5	0.58	1.21
6	Min.	15.5	2.10	9.0	213.0	214.0	213.0	212.0	186.0	182.0	106.0	*"Welo"	....	....	....	....	....
	Max.	to	4.20	10.0	217.0	217.5	217.0	216.0	189.0	183.0	107.0	Low press.	....	....	....	....	....
	Aver.	3.55	3.03	9.16	214.7	215.4	214.6	212.5	188.5	182.0	106.7	Trap	214.9	99.1	36.0	0.00	....
7	Min.	10.29	4.50	8.00	217.0	218.0	216.0	207.0	172.0	173.0	95.0	"Sarco"	....	....	....	....	....
	Max.	to	4.60	10.00	217.5	218.25	217.0	217.25	194.0	197.0	101.0	*.....	....	....	....	....	....
	Aver.	12.29	4.54	9.32	217.3	218.10	216.9	214.5	181.0	180.2	99.0	.....	217.4	99.2	41.0	0.25	0.6
8	Min.	2.25	3.1	7.5	215.0	215.0	214.5	215.0	191.0	183.0	97.0	Marsh	....	....	....	....	....
	Max.	to	5.6	9.5	219.0	220.0	219.0	219.0	192.0	188.0	104.0	*Reflex	....	....	....	....	....
	Aver.	4.25	5.08	9.1	218.1	219.1	218.2	217.5	191.8	186.0	101.4	.....	218.3	99.3	39.5	0.03	....
9	Min.	10.12	3.9	9.0	217.5	217.0	215.6	216.0	180.0	176.0	75.0	*Dunham	....	....	....	....	....
	Max.	10.12	4.0	10.5	217.5	217.0	216.0	216.0	184.0	190.0	79.0	No. 1 Radiator	....	....	....	....	....
	Aver.	10.12	4.0	10.0	217.5	217.0	215.8	216.0	182.0	187.5	76.0	Trap	216.8	99.2	39.1	0.00	....

*All the traps tested operated without noise, and none of them allowed air or water to gather in the radiator.

HEATING CONTRACT AWARDED.

The B. F. Sturtevant Co., of Canada, Ltd., Galt, Ont., have been awarded the contract for the heating and ventilating equipment for a new shop which the Canadian Locomotive Co. are building in Kingston, Ont.

JAMES ROBERTSON'S PICNIC.

The annual picnic of the James Robertson Co., Limited, Toronto, was held at Centre Island on Saturday, June 19th, and was one of the most successful ever held in the history of the company.

All the employees of the company, including the travelers, office staff and a large number of the fair sex, were on hand to cheer along the ball teams and contestants of the various sporting events.

The ball game proved very exciting and in the seventh innings the factory threw a scare into the office team by rolling up four runs, which reduced the Ink-slingers' lead to a narrow margin. However, Herbert pulled himself together and worked out of a tight hole. The final score was 8 to 5. Battery for the Ink-slingers, Herbert and Thompson; battery for Factory, Shieldrake and Western. "Dick" Crassley made a very efficient "ump," although the "rooters" (among whom were noticed Mr. L. L. Anthes, Anthes Foundry Co., and Mr. Geo. Gouinlock, Jr., of the Toronto Hardware Co.) found fault with a number of "Dick's" decisions and finally mobbed him.

Program.

1—Baseball (2 p.m.).
2—Tots' Race.
3—Girls under 12, 50 yards.
4—Boys under 12, 50 yards.

Geo. McQuillan, one of The James Robertson Co.'s Ontario representatives. "win's the umbrella by a toe."

5—Single Ladies, 75 yards.
6—Single Men, 100 yds.
7—Married Ladies, 75 yds.
8—Married Men, 100 yds.
9—Hop, Step and Jump.
10—Fat Man's Race, 50 yds.

No competitor to take more than two prizes, one first and one second.

The races which were run off immediately after the ball game, brought out some athletes who had hitherto been unknown. "Len Huckle" took first in the hop, step and jump, breaking the Robertson record by eight inches. The records are kept from year to year and "Huckle" certainly deserved the applause that greeted the measurers' announcement.

The closest and most enjoyable race of the day, however, was the "Fat Man's Race." From a large number of contestants "Geo. McQuillan," the firm's Eastern Ontario representative snatched a victory by a very narrow margin; the judge claimed that "George" just won by the thickness of his vest. The Sanitary Engineer's artist, who was in attendance, caught "George" coming under the wire.

ECHOES FROM THE RECENT CONVENTION.

Crawford, entering the Convention Hall: "Say, boys, pardon me being late, but my wife presented me with something this morning. Guess what it was?" Says Walker, "A fine girl." "No, guess again." Says Frankland, "A boy." "Oh," replied Crawford, "somebody's been telling you." The fact of the matter is that Sanitary Engineer didn't quite make sure what it was, but decided it must be a child. Crawford was highly pleased anyway, and if it's not a potential sanitary engineer, we hope it will choose one for a life-partner when it gets old enough, with the understanding that its choice will be as good as its Dad's.

SANITATION AT SUMMER RESORTS

(Continued from page 14.)

perly screened, to prevent the entrance of flies and mosquitoes.

Summer resorts usually depend upon wells for water supply. In such places the water supply should be carefully considered, as bad water is a prolific carrier of disease. The location should be such that the natural drainage is away from the well, and should be as far as possible from closet, stable, cesspool or other contamination.

Where outside closets are used, they should be frequently cleaned and always deodorized by the use of lime, a solution of copperas, wood ashes or even dry earth.

Garbage should be kept in a closed fly-proof receptacle and two or three times a week it should be removed and buried at least a foot under the ground.

On account of lack of conveniences, greater care of sanitary conditions is re-

quired in the country than is usually necessary in the city. Summer visitors should, therefore, take care that their surroundings are such as will not result in their returning to their homes with the germs of typhoid to offset any advantages of the summer's change.

PRACTICAL SANITARY SCIENCE.

(Continued from page 16.)

should be added to the size of registers to allow for the grilles.

The positions of the ventilating inlet and outlet are very important and vary in practice with the kind of building or size of rooms. The best authorities seem to agree that for rooms in dwellings or schools the inlet is best near the ceiling and the outlet on the same side of the room near the floor (see Fig. 17). It has been found by experiment that the entering air is by this method better diffused throughout the room than by any other position of the inlet or outlet. The warm air in trying to rise spreads out under the ceiling, and as it is cooled descends. In large halls or theatres the method generally adopted is to have the fresh air enter by a number of inlets in the floor and the heated exhalations from the occupants rise and are taken out near the ceiling.

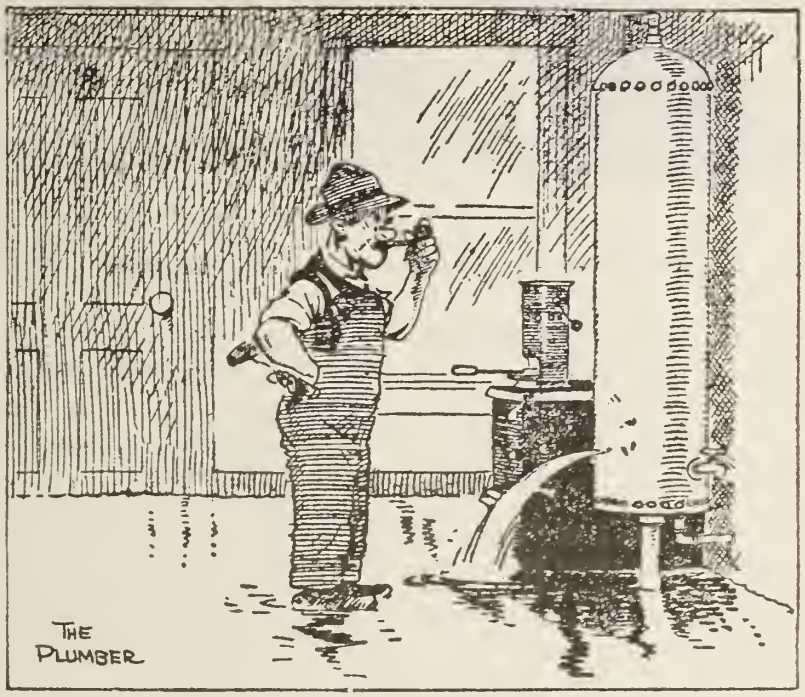
(Continued in next issue.)

PESTS.

Of all professions there is none ranks higher than that of the plumber. His science is necessary to cleanliness in present day city life and every one knows what place among human virtues cleanliness occupies. It is but natural, therefore, that those who thrive by filth, in it and with it abominate the plumber. In a Winnipeg newspaper, the Telegram, there recently appeared a cartoon representing a plumber called in to do repairs and over it appeared the headline "Pests."

By thus maligning the plumber the action of that newspaper was quite in accord with the reputation that has been brought home to it. Two Royal commissions have just disclosed the character of the political refuse upon which the paper in question has depended for its existence. For years it has been the curtain which screened from the eyes of the public the nature of the microbe that has destroyed a party. Naturally at this time the newspaper in question abominates the plumbers as well as the King's interest in political cleanliness. What the newspaper should have had, in the absence of journalists that succeeded by clean journalism, was a plumber. His motive in life is to remove filth and prevent its accumulating and becoming dangerous to life and morals. If, therefore the Telegram had had a plumber as its editor it might have saved Manitoba from a stain that will only pass away with the men and the newspaper which caused it. Like the myriad wigglers that squirm and run when a sheltering stone is lifted from them the Telegram is now ready at any time to call the apostles of cleanliness "Pests."

Pests!



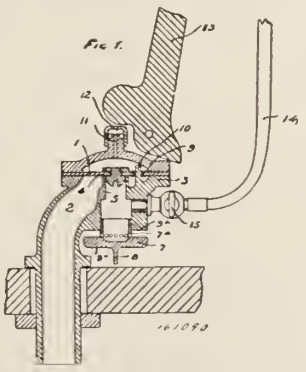
Reproduced from Winnipeg Telegram. Plumbers would have to "go some" to beat the Telegram editorial staff.

NEW CANADIAN PATENTS.

No. 161,090. Ball Cock.

John Shanks, Barrhead, Renfrewshire, Scotland, 2nd March, 1915; 6 years. Filed 30th June, 1914. Receipt No. 240,682.

Claim.—1. In a ball cock cistern water supply valve, in combination, a



valve casing having an eccentric inlet and a central outlet connection, a release valve on said casing, a float controlled member for operating said release valve, and serving to remove obstructions tending to choke said perforation.

2. In a water supply valve, the combination with a valve casing provided with an outlet connection to the cistern, of an adjustable deflector located at the discharge end of said outlet connection and consisting of a member comprising a ported tubular part having an adjustable connection with the discharge end of said outlet connection so as to vary the exposed area of the ports thereof, and a disc-like portion closing one end of said ported tubular part, said ports being between said disc-like part and the end wall of said outlet connection, as and for the purpose specified.

3. In a ball cock, in combination, a diaphragm casing having an eccentric inlet connection and a central outlet connection, a diaphragm valve co-operating with said outlet connection, and a tubular member formed with ports for discharge of water passing through said outlet connection, said member being adjustable to vary the exposed area of the ports.

One of the things that often fails to come to him who waits is the money loaned to his friends.

Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

HOW TO CUT IRREGULAR MITRES.

Editor, The Sanitary Engineer.

You have not published any tinsmithing articles recently, and there are one or two things I would like to know.

First—How long is the course likely to run?

Second—Would you kindly show how an assortment of irregular mitres can be developed, such as would be required for taking branches off a pipe or pipes? I have to do some work where there are some offsets to make in a sawdust and shaving collector. I would also like to know how a Y-piece could be developed.

T. S. R.

In answer to the first question, may say that article 18 appears on another page of this issue. The course will be completed in about 45 or 50 articles.

Second question is answered as follows:

Plate I illustrates a Y-joint in pipe. This can be a cut-off for a small conductor pipe, or a Y-joint for a large blower pipe. The size makes no difference.

The top piece P is straight and necessitates no pattern.

The pattern for the bottom is developed, as explained for problem 7, Fig. 5.

The gore piece O is very similar to the gore piece C, problem 3, plate 12, and is developed in practically the same manner.

Lay out the plan, Fig. 1; then the elevation, Fig. 2; keeping one arm of the elevation in line and directly above the plan.

One half of the plan is then stepped off and numbered, as shown, and vertical lines are carried from the numbers to the first mitre line E D, then parallel to C D, to the next mitre line A B C.

The stretchout N M is then laid out at right angles to the line C D, and the usual measurement lines drawn.

The T-square is then placed so it will run parallel to N M. Bring it against each one of the points on the mitre lines, and cut the corresponding measurement lines.

In measuring off the plan of a Y-joint, it seldom happens that any of the regular lines come into the point B on Fig. 2, therefore to get the pattern extended up to this point, we draw a line from the point B parallel to the line C D, until it touches the mitre line E D. Then we drop it vertically to the plan, Fig. 1, to get its position for the stretchout line.

We call this line "x" or anything to distinguish it from the stretchout line.

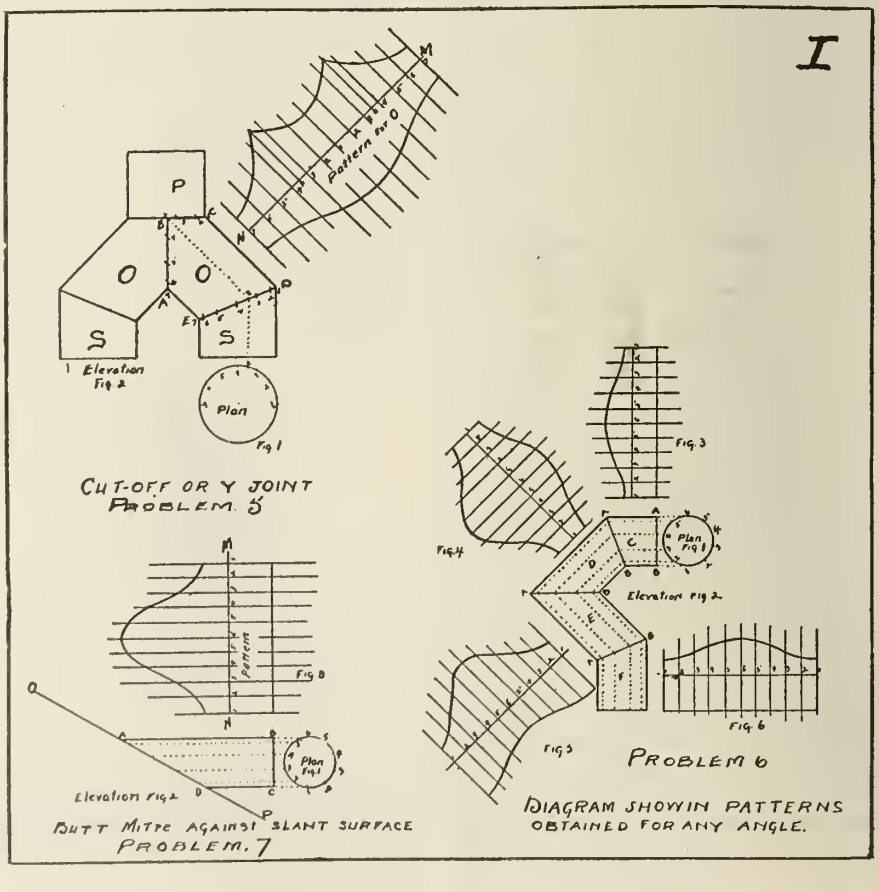
It will be noticed in this case that it comes between 3 and 4 on the plan.

Now we want a line on the stretchout to correspond to this line, to have the same position on the stretchout that it has on the plan, so we transfer the space X3 or X4 from the plan to the stretchout and draw the measurement line X.

Then place the T-square parallel to the line N M, bring it aaginst the point X or B on the elevation and cut out the measurement lines X on the stretchout.

A line traced through the points on the measurement lines completes the pattern.

Problem 6, plate I, shows elbows running in different directions. This ex-



Getting After New Business

Sanitary and Heating Engineers in Large Towns and Cities are "Seeking" and "Finding" Business—Becoming Better Salesmen Every Day—Quite a Large Number are Realizing an Improvement in Their Business.

Sixth Article of this Series.

ONE of the most encouraging signs of the times as applied to the sanitary and heating engineering profession, is that which shows that sanitary and heating engineers are using more "printers' ink." They are doing more advertising, and doing it seriously. Never before in the history of the trade have there been as many advertisements in the daily and country local newspapers as there are at this present time.

In times past sanitary engineers have been content to wait for people to call in and give them work, or ask for tenders. To-day sanitary engineers are actually getting after work, and getting it.

May the times never return when work will flow in as it has done in the past. Not that we wish work not to be more plentiful, but it is a well known fact that the work which has come our way in recent years has not been of very great benefit; prices have been cut to pieces, and as a result every one is feeling the evil of such practices.

Some weeks ago we published an item referring to the annual meeting of the American Radiator Co. The president, Mr. Wooley, stated that he was pleased to be able to inform the shareholders that a very nice profit had been made during the year 1914. He said:

"While the greater part of the demand for boilers and radiators comes from the construction of new buildings, their introduction in old buildings has become a very important part of the total demand. The business from this source is gradually increasing."

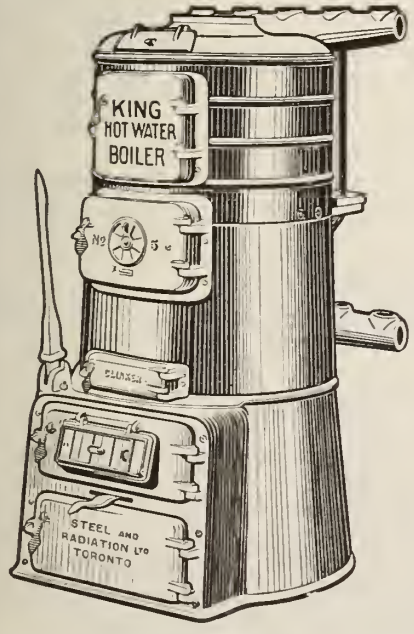
This state of affairs should be the same in Canada as in the United States.

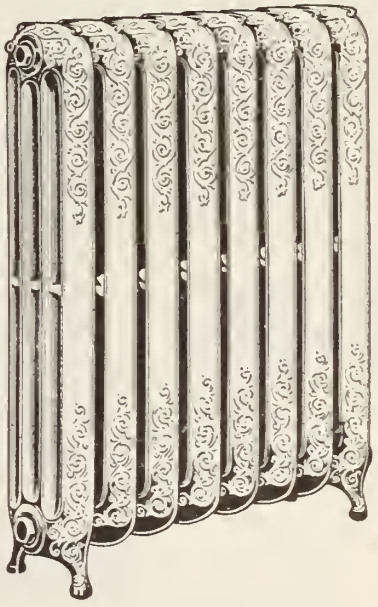
The savings bank deposits are on the increase, simply because business men cannot stem the tide. Every second business man you meet begins to discuss the war. Such should not be the case. Selling plans should be worked out, the public should be shown that it is just as unpatriotic to one's country to refuse to risk one's money in the ordinary way, as it is for an able-bodied man with no dependents to refuse to risk his life for his country. It is the hoarding of money which is causing more trouble than the war. One is costing human life too much, the other is costing business life too much. Business men to-day should be out seeking business recruits, recruits who are willing and ready to risk money for the sake of establishing commercial stability, free from pessimism. If our military recruiting officers were to have as much blue ruin in their veins as some of our busi-

(Continued on page 34.)

INSTALL A SANITARY HEATING SYSTEM

This is the time to have your heating system overhauled, or else install a new system.





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Drop us a line and we will furnish you with all particulars, or call in and see us.

RAY BROWN & COMPANY

SANITARY AND HEATING ENGINEERS

COMFORTVILLE

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In Safety First and always.
In providing for the Health of my Fellow Workmen.
In Light and Air and Sanitary Working Conditions.
In clean, fresh drinking water for everybody.
In the Safety, Economy and Man-betterment of the

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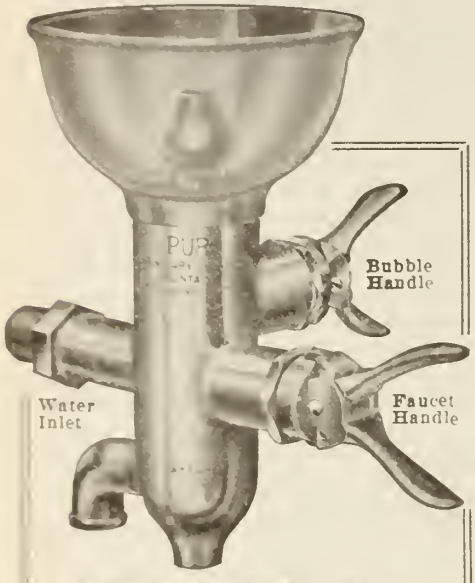

T[illegible] of a man through impure drinking [illegible] a room that "the front office" must [illegible]

A[illegible] "[illegible]", isn't it? But true, abso[illegible]

W[illegible] a man comes to work in your factory [illegible] with in your keeping.

A[illegible] taking chances on such a [illegible]

[illegible] conditions are responsible for more [illegible] than any machine ever built.

A[illegible] Safety First Principles to your [illegible] don't deny your men a clean, [illegible] drink of water.

C[illegible] your water and they will improve [illegible] mark yourself as worthy of the [illegible] employ.

[illegible] Gold Medal winner Puro in your [illegible] office and shop alike.

The [illegible] Sanitary Drinking Fountain that is [illegible] simple, automatic in control and [illegible]

Let us tell you how what it will cost you to

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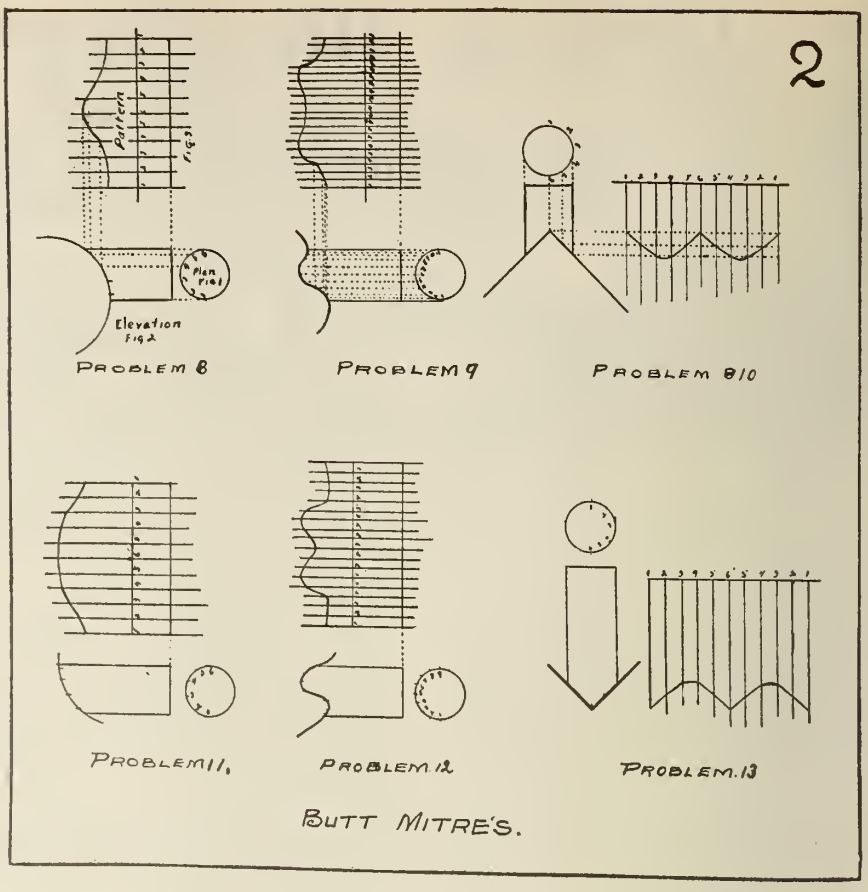


ample is intended for practice on what the student has gone through. The principle is the same as 2 and 3-piece elbows and serves to illustrate the different shapes assumed by the pattern for different turns and angles.

Problem 7, plate I, illustrates a pipe butting against a slanting surface and is called a butt-mitre, and is developed the same as explained in the development of a square elbow.

The plan Fig. 1 is drawn, then the elevation Fig. 2, then the stretchout N M is laid out at right angles to the line A B.

Divide the plan off into equal spaces and carry the points to the slanting surface O P, and then to the corresponding measurement lines, the pattern is then developed for the section A B C D.

It does not matter what the shape of the surface O P is like, or the shape of the pipe or moulding. The principle of developing a butt-mitre is the same. The pipe or moulding is divided into smaller spaces for irregular surfaces.

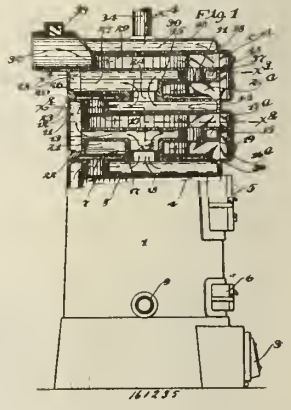
Problems 8 to 13, plate 2, are examples of butt-mitres, and are, as before mentioned, developed the same as explained for problem 7.

CANADIAN PATENTS.

No. 161,235. Boiler for Heating.

Frederick J. Walling, Minneapolis, Minnesota, U.S.A., 9th March, 1915; 6 years. Filed 24th December, 1913. Receipt No. 232,694.

Claim.—1. In a hot water or steam boiler, the combination with a main shell including a firepot, of a superstructure, including a water conduit and draft passage, said water conduit including horizontally expanded chambers and axially located connecting passages, and said draft passage including horizontally expanded chambers interposed between the horizontally expanded water chambers, the said horizontally expanded draft chambers being connected by alternately offset vertical passages causing the flame to positively take a zigzag course, and to repeatedly spread out against the under



surfaces of the horizontal expanded portions of said water conduit.

GETTING AFTER NEW BUSINESS.

(Continued from page 33.)

ness men, this country would soon be off to the bow-wows.

This is a time when every sanitary and heating engineer should be out and amongst the house owners, showing that the country needs business, etc., and pointing out that the furnace requires some attention in that house of theirs, and that the only practical way of showing one's loyalty to one's country is by joining the firing line at the front, or by spending money now.

An Invention of Great Importance

The ordinary tank water heater can only be set in operation by lighting the gas when standing by the heater. If a person is in the bathroom and requires hot water, they must go downstairs to light the heater, also to extinguish it.

The "Stack Distant Control"

Is a recent invention which makes the tank heater much more convenient. With this attachment installed in connection with a Stack Gas Water Heater, the tank and the heater may be connected in either the basement or the kitchen, and the heater may be operated from any point in the house, thus making a tank heater practically automatic.

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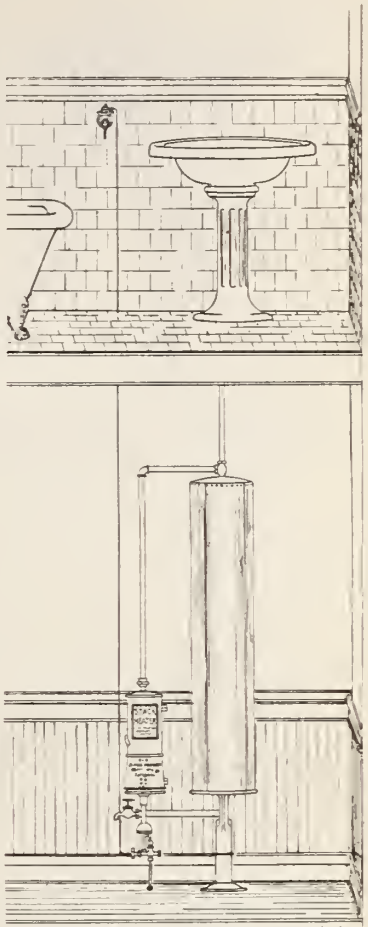

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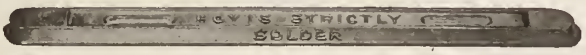

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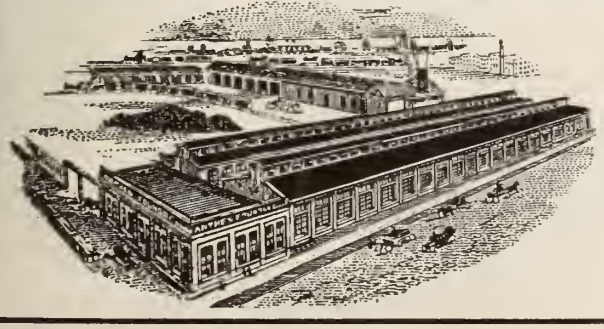
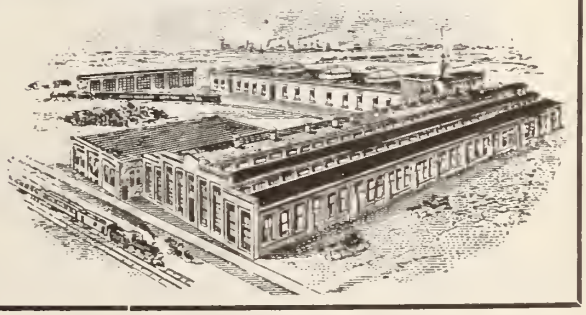


MANUFACTURERS OF

CAST IRON SOIL PIPE AND FITTINGS



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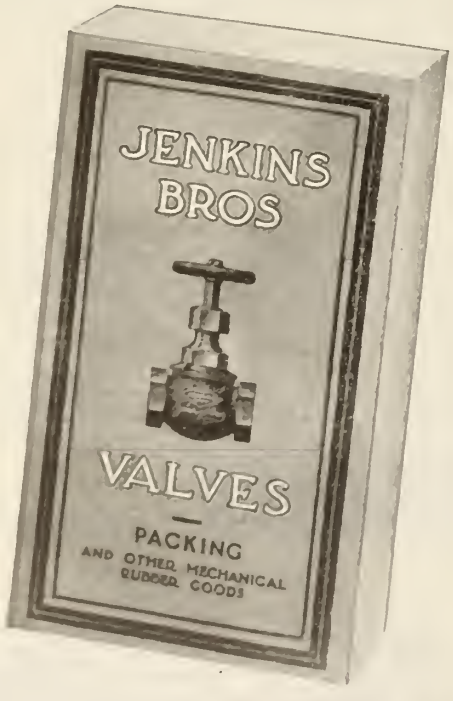

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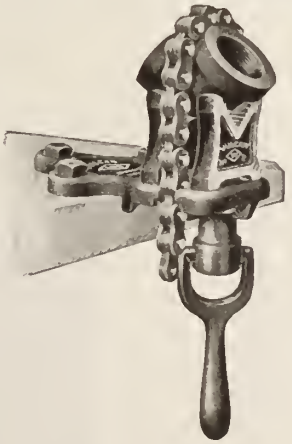

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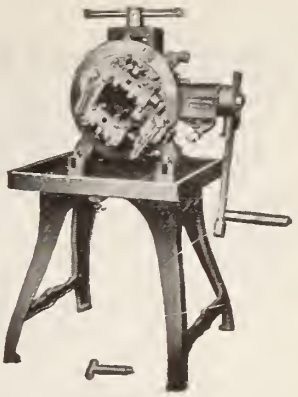

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Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.

Threads Rods from ½ in. to 2 in., right or left.

American or Whitworth Threads.

Using the genuine Armstrong Dies.

All parts are interchangeable.

A time and labor saving machine.

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WRITE FOR CATALOGUE

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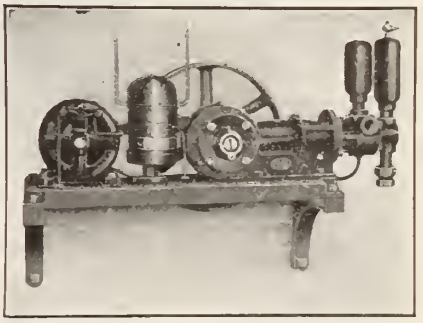

Every plumber and jobber should write to the Fort Wayne Engineering & Mfg. Co. (Dept. S), Fort Wayne, Indiana, and ask for Bulletin 4073, which describes this popular pump for residence service.

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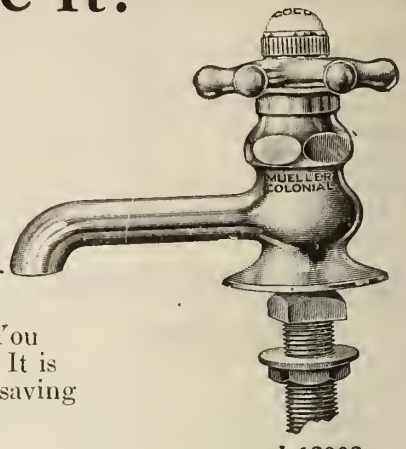

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Send me literature and prices on Self-Closing Work.

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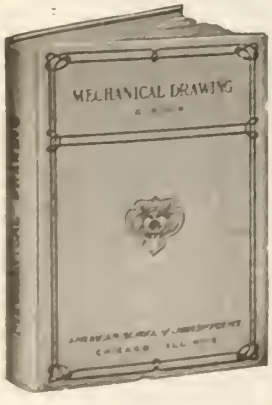

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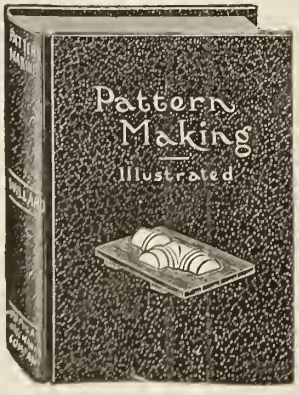

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A book for the man who does the work. Written by a practical patternmaker of many years' experience. Gets right down to business in the first chapter and keeps it up throughout the book. Full of kinks and actual working information. Profusely illustrated.

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Jenkins Bros., Ltd., Montreal.
Kerr Engine Co., Ltd., Walkerville.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Aquarias.
A. F. Small, Toronto.

Asbestos Goods.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Boilers, Steam or Hot Water.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Boiler Feed Regulators.
C. A. Dunham Co., Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods
Canadian Wolverine Co., Ltd., Chatham.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., London.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Cellar Drainers.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Penberthy Injector Co., Ltd., Windsor, Ont.

Closets.
Amherst Foundry Co., Amherst, N.S.
B. O. T. Manufacturing Co., Toronto.
Cluff Mfg. Co., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Consulting Engineers.
H. L. Seymour.

Correspondence Schools.
Anglo-American Sanitary School.

Country Residence Equipments.
Empire Brass Mfg. Co., London.
General Machinery Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Limited, Toronto.
Jno. Stevens & Co., Ltd., Winnipeg.

Damper Regulators.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
Empire Brass Mfg. Co., London.
Fittings, Limited, Oshawa.
International Malleable Iron Co., Ltd., Guelph, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.
Penberthy Injector Co., Ltd., Windsor, Ont.

Ejectors for Sewage.
National Equipment Co., Ltd., Toronto.

Enamelware.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Electric Pumping Machinery.
Ashdown Hardware Co., Ltd., Winnipeg.
Empire Brass Mfg. Co., London.
General Machinery Co., Ltd., Toronto.
National Equipment Co., Ltd., Toronto.
Jno. Stevens & Co., Ltd., Winnipeg.

Fittings.
Empire Brass Mfg. Co., London.
International Malleable Iron Co., Guelph.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., London.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
Canadian Wolverine Co., Ltd., Chatham.
Gurney Foundry Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Garbage Burners.
Gurney Foundry Co., Ltd., Toronto.

Gasoline Engines.
National Equipment Co., Ltd., Toronto.

Gas Water Heaters.
Gurney Foundry Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Gas Generators.
P. Campbell & Co., St. John, N.B.

Generators.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Gurney Foundry Co., Ltd., Toronto.
Harris Construction Co., Ltd., Montreal.
E. S. Manny Co., Montreal.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
Empire Brass Mfg. Co., London.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Lighting Plants.
P. Campbell & Co., St. John, N.B.

Mixing Valves.
Geo. Carpenter, Montreal.
Standard Sanitary Mfg. Co., Toronto.

Nipples.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
Warden King, Ltd., Montreal.

Oil Storage Systems.
General Machinery Co., Toronto.
National Equipment Co., Ltd., Toronto.

Packing.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

Pipe Joint Compounds.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.

Porcelain Ware.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Cluff Bros., Church St., Toronto.
C. A. Dunham Co., Ltd., Toronto.
General Machinery Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
John Stevens & Co., Ltd., Winnipeg.

Radiators.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn.

Radiator Traps (Steam.)
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.

Solder.
Hoyt Metal Co., Toronto.

Steam Specialties.
Dart Union Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
[illegible] Engineering Co., Alpena, Mich.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville, Ont.
The E. S. Manny Co., Montreal.
Penberthy Injector Co., Ltd., Windsor, Ont.

Steam Traps.
Canadian Morehead Co., Ltd., Woodstock.
C. A. Dunham Co., Ltd., Toronto
Harris Construction Co., Ltd., Montreal.
E. S. Manny Co., Montreal.

Smoke Test Machines.
James Morrison Brass Mfg. Co., Toronto.

Testing Plugs.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.

Tools.
Armstrong Mfg. Co., Bridgeport, Conn.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tap & Die Co., Ltd.
Hall & Sons, Ltd., Brantford.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.

Unions.
Dart Union Co., Ltd., Toronto.

Vapor Heating Systems.
C. A. Dunham Co., Ltd., Toronto.

Vitro Tanks.
Cluff Mfg. Co., Toronto.

Vacuum Systems of Heating.
C. A. Dunham Co., Ltd., Toronto.

Water Supply Systems.
Ashdown Hardware Co., Ltd., Winnipeg.
Empire Brass Mfg. Co., London.
General Machinery Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
John Stevens & Co., Ltd., Winnipeg.

A County Fair Re-born

A story of how a town secured an attendance of over 14,000 people in two days.

—W. A. Craick has investigated the why of the regeneration of one of the local country fairs of Canada, which was about to be closed up by the directors as a hopeless case. A diagnosis was held and before it was declared a corpse modern resuscitation methods were to be tried.

—The result was a happy one. An attendance of less than **4,000 was turned into 14,000,** and the gate receipts grew rapidly to the surprising figures of $10.345.09 instead of $1,760 on the previous year. Now how was all this done?

—The story of the means employed is well told in the **July issue of the Farmer's Magazine**—the brightest farm paper now reaching the Canadian farm areas.

—Every director of a fair and every merchant who believes in getting people into his town should read a copy of this journal.

—Moreover other articles of interest are given under the following heads:—

A 135-Acre Farm Spends Thousands.
Home-Canning for Profit.
Making Broiler Returns Pay.
The Nuisance of a Big House.
The Business of Dairy Farming.
Furnishing the Living Room.
Zebu Cattle in Brazil.
Sources of Prosperity—The Silo.

And many other features, with nearly 100 photographs, while the cover design suggests country life comforts

Send for a copy at once.

TWENTY CENTS A COPY — TWO DOLLARS A YEAR

MacLean Publishing Co., Limited - Toronto, Ontario

DART UNIONS

NEVER LEAK

Dart Unions last indefinitely, because there is no deterioration at the joint, and the heavy iron parts will not stretch or pull apart.

Dart Unions are easily and quickly installed whether pipes are in or out of line, and they stay tight till deliberately loosened with a wrench.

The Dart's Service and Efficiency keep you free from complaints, and are an important factor in gaining your customer's confidence and re-orders.

BOTH FACES ARE BRONZE

SOLD BY ALL JOBBERS.

Manufactured by Dart Union Co., Limited, Toronto, Canada

KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

This plant is at your service.
Help us keep it busy.

REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

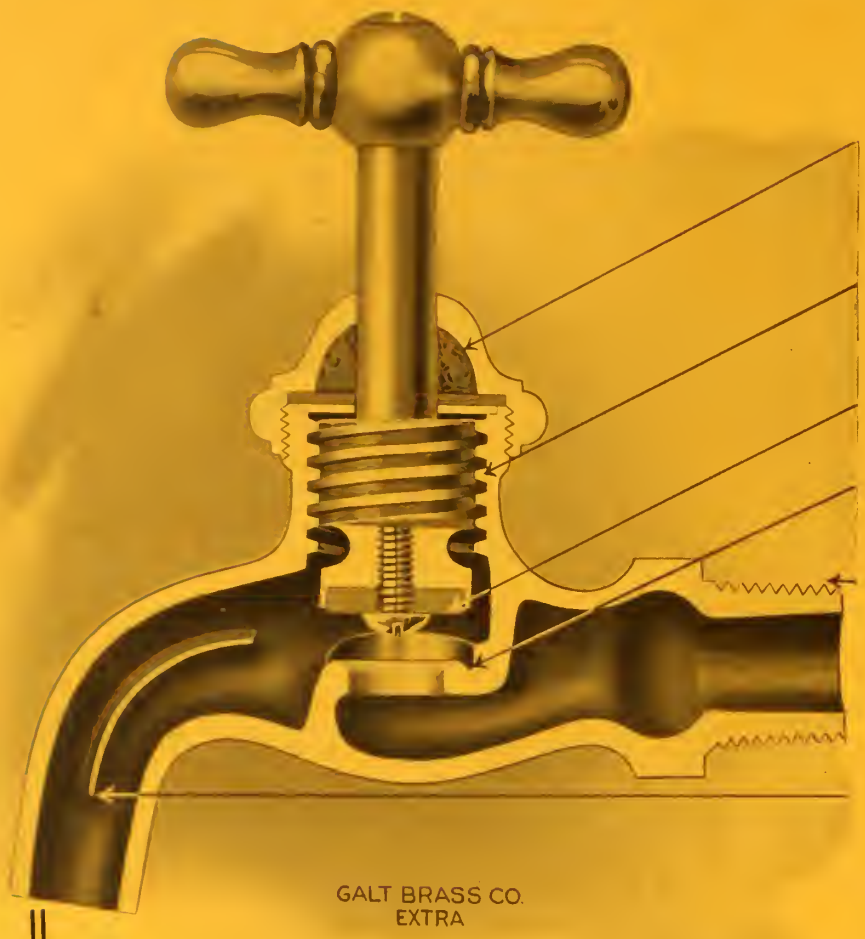
Quickest possible deliveries. Consistent Prices. Best quality of goods. Write for Catalog No. 5.

The Kerr Engine Company, Limited

Walkerville, Ontario

Valves and Hydrants Exclusively

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER

PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX | Publication Office : TORONTO, AUGUST 2, 1915 | No. 15

AT YOUR SERVICE

Interior Views
"Standard Ideal"
Showrooms

Montreal *Toronto*

Hundreds of people daily visit our Showrooms—Trade and Public—Customers and Prospects—some to buy or select; others to secure certain information, or, simply to examine our products in anticipation of their later requirements.

Our Showrooms are at your service—all the facilities they afford are available any time—always, for your interests or the interests of your customers or prospects.

All of our showroom fixtures are priced in plain figures—and provide a liberal profit for the plumber.

The Standard Ideal Company Limited

General Offices and Factories: Port Hope, Canada

TORONTO
119 King St. East

MONTREAL
42 Beaver Hall Hill

WINNIPEG
80 Lombard St.

VANCOUVER
410 Carter Cotton Bldg.

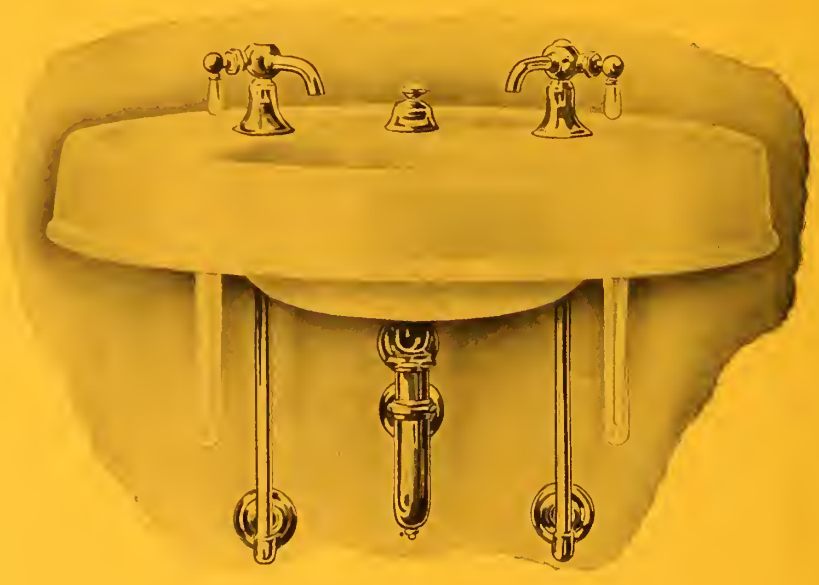
SUPERIORITY PURITY DURABLE AS THE PYRAMIDS

SUPERIORITY PURITY DURABLE AS THE PYRAMIDS

The Largest Exclusive Cast Iron Enameling Sanitary Works Under The British Flag.

Beaver Brand
Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.



The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

Amherst Foundry Co., Limited

General Offices and Factory: Amherst, Nova Scotia

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co.,
71 Brown St., Toronto

MANITOBA and NORTHWEST:
E. B. Plewes,
120 Lombard St., Winnipeg

BRITISH COLUMBIA:
A. O. Campbell,
864 Cambie St., Vancouver

The Test is Going to be Made

We have now received definite word from the manufacturers who accepted our challenge name on request) that they are almost ready.

The Test is to be Completed by August 15th.

Watch for the announcement as to the result.

We Claim That the Presto Heater is 25% More Efficient Than Any Other

and we challenged every heater manufacturer to disprove our statement.

Only one manufacturer thinks his heater is as good as the Presto. The test will prove who is right.

The other heater manufacturers are evidently willing to agree that none of them can equal the Presto—for they all ignored the challenge.

Positive Proof Gladly Sent on Request

Harris Construction Co., Limited

120 Sanguinet Street, Montreal

TRADE B.O.T. MARK

B-O-T

LOOK FOR THE TRADE-MARK

WATER CLOSETS

WOODWORK: Guarantee against cracking and splitting. Tanks are lock-doweled; Seats spiral-doweled.

FITTINGS include B-O-T "FOOL-PROOF" LEVER and B-O-T BALLCOCK.

BOWLS: All kinds, as well as the B-O-T "Non-clogging" Bowl with the straight expanded leg.

The B-O-T Mfg. Company, Limited

B-O-T BUILDING

159-161 Richmond St. West, TORONTO

Montreal: Thos. Robertson & Co., Ltd.
Vancouver: The Robertson-Godson Co.
Edmonton: Carroll-Wilson Co., Ltd.
Winnipeg: J. H. Leonard 405 Tribune Building

No. 11 R

"Jardine" Adjustable Ratchet-Threading Tool

Capacity, 1" to 2", inclusive, Right or Left.

Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

"Jardine" and "Toledo" Pipe-Threading Tools

reduce the labor of pipe threading 50 PER CENT. and make threads as clean and perfect as if cut on a Lathe WITH ONLY ONE CUT.

"Jardine" or "Toledo" dies spare the muscle of the man who does the work, and save money for the man who pays the wages, as they enable one man to do the work of two and cost less for repairs.
No cams or jimcracks to wear and get out of order.
Cutters that cut, don't squeeze.
Set of cutters for each size of pipe.
Lead screw ensures perfect pitch and form of threads.
Adjustable to all variations of fittings, very durable cutters.
IS NOT A TOOL LIKE THIS WORTH YOUR CLOSEST INVESTIGATION? We'll be pleased to put you in touch with users and send catalog. Write!

MADE IN CANADA. **All threads finished at one cut. One man does the work of two.**

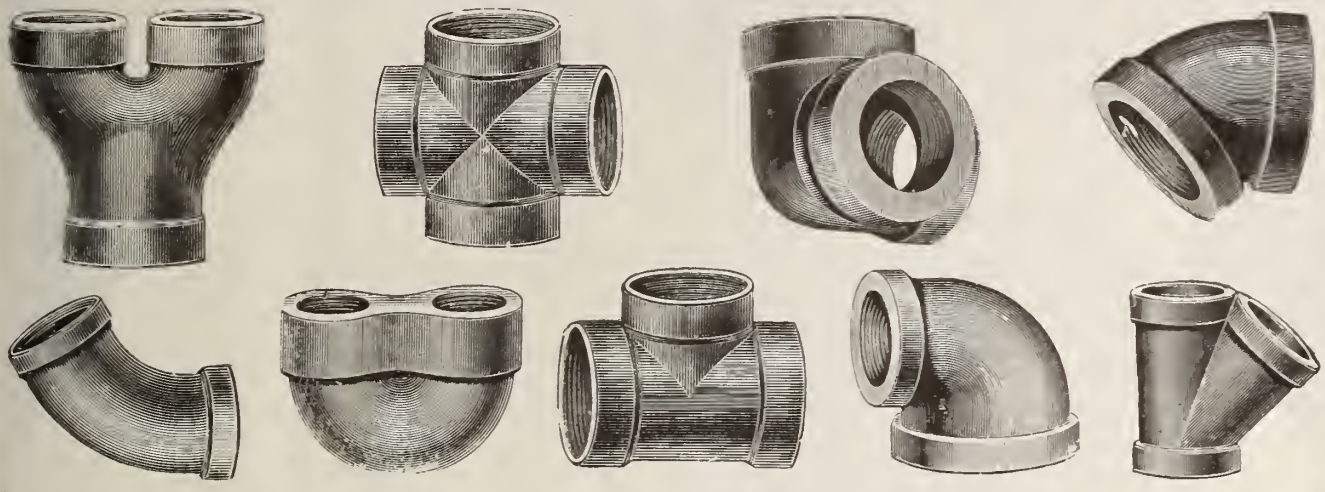
A. B. JARDINE & CO.

HESPELER, ONTARIO

Sole Makers of "Jardine" Pipe-Threading Tools. Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada. Agents: Winnipeg and West—Stanley Brock, Ltd., Winnipeg, Man. Brockville and East—J. R. Devereux, 233 St. James St., Montreal.

SCREWED CAST IRON STEAM FITTINGS

MADE IN CANADA

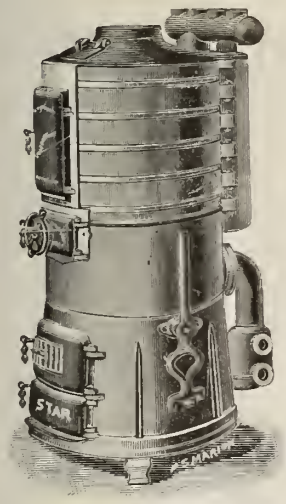


We manufacture and carry in stock a complete line of Screwed Cast Iron Steam Fittings. Also Flanged Fittings, both standard and extra heavy.

WARDEN KING, LIMITED, MONTREAL

BRANCH—200 Adelaide St. West, Toronto CITY SALES OFFICE—151 Craig St. West, Montreal

"MADE IN CANADA"



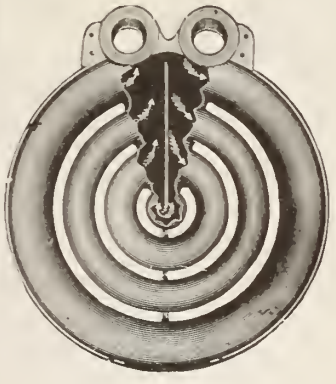
The quickest and most economical.

The "New Star"

Hot Water Heater

The most improved on the market. The only Heater having a *Tubular section* giving one-third more heating capacity than any Flat Section Heater, and dividing the water, making it easier heated.

Over 35,000 New Star Boilers in use, all giving entire satisfaction.

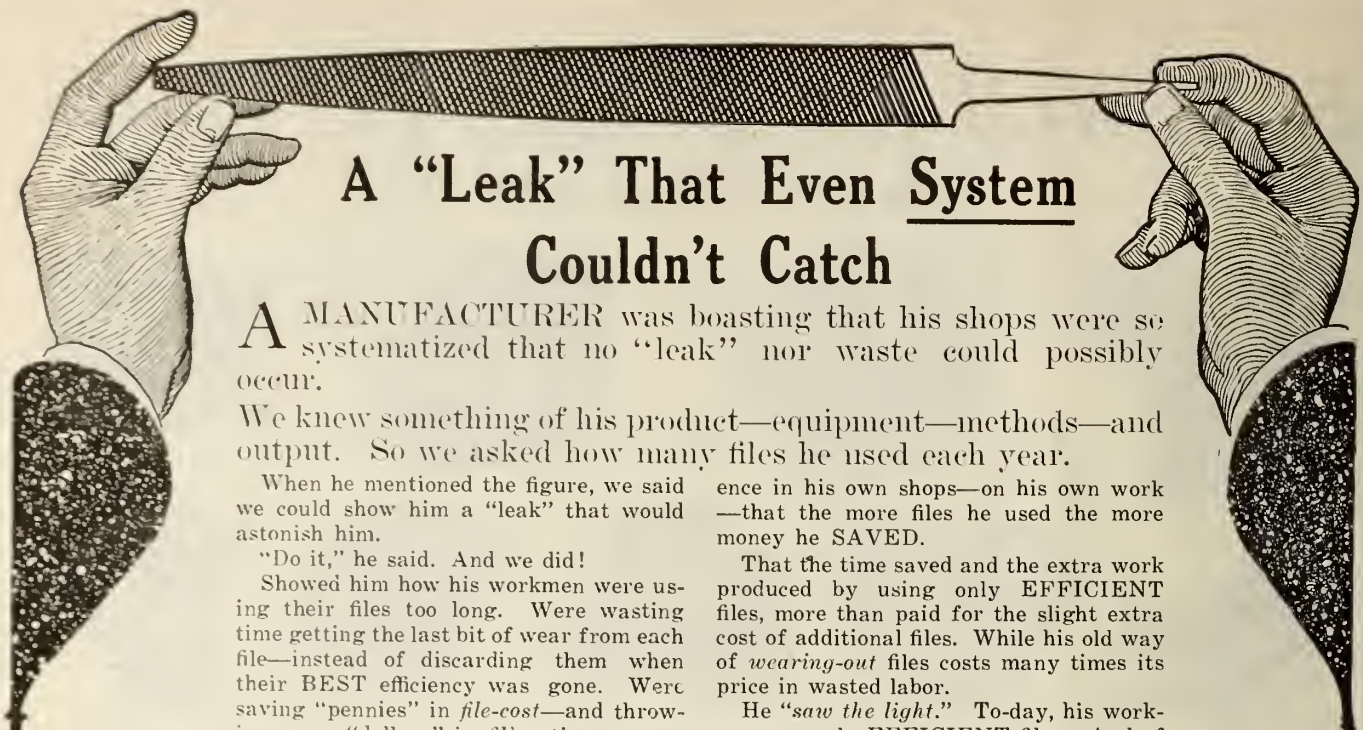


Section absolutely unbreakable.

Manufactured by

The Star Boiler & Radiator Company, Limited

New Premises: 1353 St. Lawrence Blv'd, MONTREAL



A "Leak" That Even System Couldn't Catch

A MANUFACTURER was boasting that his shops were so systematized that no "leak" nor waste could possibly occur.

We knew something of his product—equipment—methods—and output. So we asked how many files he used each year.

When he mentioned the figure, we said we could show him a "leak" that would astonish him.

"Do it," he said. And we did!

Showed him how his workmen were using their files too long. Were wasting time getting the last bit of wear from each file—instead of discarding them when their BEST efficiency was gone. Were saving "pennies" in *file-cost*—and throwing away "dollars" in *filing-time*.

We proved to him—by personal experience in his own shops—on his own work—that the more files he used the more money he SAVED.

That the time saved and the extra work produced by using only EFFICIENT files, more than paid for the slight extra cost of additional files. While his old way of *wearing-out* files costs many times its price in wasted labor.

He "*saw the light.*" To-day, his workmen use only EFFICIENT files. And of course they're the "Famous Five":

KEARNEY & FOOT GREAT WESTERN AMERICAN ARCADE GLOBE

(Made in Canada)

Nicholson File Company - Port Hope, Ont.

Dealers Everywhere

Mr. "Licensed" Plumber

BULLETIN No. 4

Are you advising your clients to have all new buildings piped throughout for gas?

No modern building is complete unless so piped. Every structure built needs gas lighting fixtures, and gas appliances of one sort and another.

Pipe the buildings first—make sure that the piping used is large enough to supply all possible needs, then sell and install the fixtures and appliances,—thus adding to your profit and laying foundations for future business.

We will help you—consult us.

The Consumers' Gas Company of Toronto

12-14 Adelaide Street West **Adelaide 2180**

OSBORNE HOUSE, ISLE OF WIGHT
FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

ROYAL PALACE OF LA MAGDALENA
SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
55-59 Richmond Street, West

HAMILTON STORE
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BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND

THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY, ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

ALL LIFE'S A FIGHT

For Health or For Wealth

TUEC Stationary Cleaners provide means whereby the health of the home is ensured from dust, in which lurks millions of Death-dealing germs.

NO HOME can lay claim to being sanitary where the broom is used.

SANITARY ENGINEERS who sell and install **TUEC** service sell health service.

MADE IN CANADA.

TUEC Stationary Cleaners bring well-earned wealth to Sanitary Engineers and health to their customers.

EVERY EQUIPMENT nets you 27% profit and a satisfied customer.

IF YOU ARE NOT putting forth your very best effort to sell the first **Tuec** in your district, you are throwing good money away.

Write us at once. Improve your country's health and increase your own wealth.

THE UNITED ELECTRIC CO., TORONTO

159 West Richmond Street

TUEC was awarded Grand Prize at Panama-Pacific Exposition.

Malleable Iron Hook Hanger

Instantly Adjustable

to any pitch wanted. Simply throw back cam and adjust as desired.

Can be furnished with extension pieces up to 10 ft.

Write for Catalog and Prices.

The BEATON & CADWELL MANUFACTURING Co.

New Britain, Conn.

Eastern Agent: J. R. Devereux, 223 St. James St., Montreal.
Western Agent: A. E. Hinds & Co., Chamber of Commerce, Winnipeg.

FOR STRENGTH DURABILITY AND EFFICIENCY

V Jaws and Regular Jaws

Narrow or a Square Bead

USE IDEAL CHAIN WRENCHES

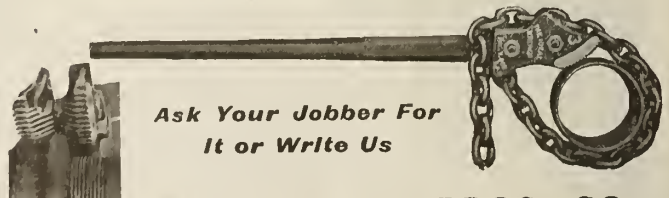
GRIP PIPE, FITTINGS, CASTINGS of all kinds, regardless of size, shape or location.

The combination of V Jaws and Regular Jaws

GRIPS EVERYTHING

Built for Heavy Duty and Quick Service.

A Trial Will Convince You.



Round Bead

Ask Your Jobber For It or Write Us

KROESCHELL BROS. CO.

475 W. Erie St., CHICAGO

Wolverine Tank Balls

—Guaranteed

The ball with the reinforced top which makes elongation impossible.

Made of the finest rubber and will outwear three ordinary tank balls.

Our full line of Quality Rubber Goods are at your command, and if you want to give satisfaction all the time, use only Wolverine goods.

Canadian Wolverine Company
Limited
CHATHAM, ONT.

POPULAR IN CANADA

Ten years ago Honeywell methods of hot water heating were introduced in Canada. To-day there are thousands of Honeywell systems in use throughout the Dominion, which unquestionably proves their popularity and real value. You cannot make a mistake when you install hot water heat for a customer if you specify the Honeywell system.

Honeywell methods are based on reliable engineering data—all guesswork is eliminated. You can install Honeywell hot water with positive assurance that the job will work when completed because the principles involved are correct and have been established for years.

You are offered a choice of two ways of installing—the expansion tank can be placed either above or below the radiation, depending on the construction of the building or the wishes of the owner.

We will be pleased to supply you with complete information on Honeywell methods and equipment—it is handled by leading dealers in heating supplies everywhere.

Honeywell Heating Specialty Co., Wabash, Indiana

3,784 FEET from Boiler to Radiator!

AT THE Massachusetts Agricultural College, Amherst, Mass., the heating system is required to take care of TWENTY-FOUR buildings scattered over an area of a square mile.

From the Power House to the most distant hall measures 3,784 FEET!

The condensation from all this heating equipment is being drained and returned to the boilers in the Power House by means of the

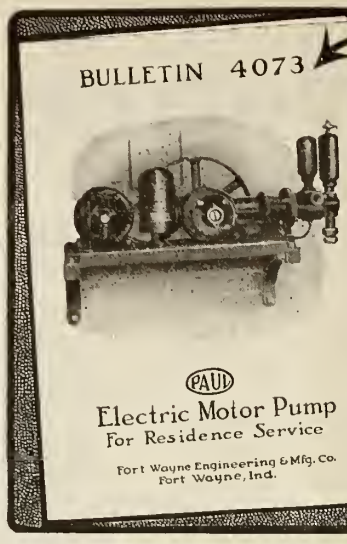
Morehead Back-to-Boiler SYSTEM

In addition to cutting the cost of fuel by delivering the condensation DIRECT to the boilers—by making it available as feed water when it is *pure* and *hot*—the "Morehead" System is so simple—so easy to install—so satisfactory to use—that thousands of up-to-date Plumbers and Heating Engineers all over America now specify it on ALL jobs involving the use of steam.

The "Morehead" Back-to-Boiler Book is full of the kind of pictures and data which will interest you.

Write for it to-day.

Canadian Morehead Mfg. Co.
Dept. "C"
Woodstock Ontario



Send today for Bulletin 4073

It Tells All About the PAUL

ELECTRIC MOTOR PUMP

Mr. Plumber:—
Here is a perfect, low-priced electric motor pump adapted to all the requirements of the moderate priced home. Easy to install—noiseless—economical. **There's money in it for you if you push this pump.**

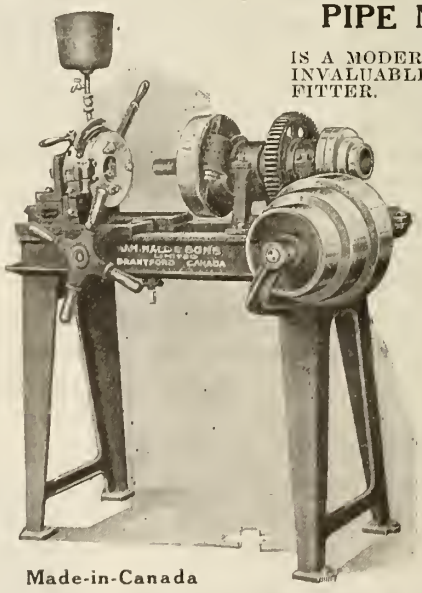
Give us your port of entry and we will quote you a price delivered to that point.

Fort Wayne Engineering & Mfg. Co. (Dept. S)
Main Office and Factory: Fort Wayne, Indiana
AGENCIES IN THE PRINCIPAL CITIES OF CANADA

Save TIME and PIPE and CUT TRUE THREADS

THE HALL NO. 2 PIPE MACHINE

IS A MODERN TOOL THAT IS INVALUABLE TO THE PIPE FITTER.



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Built in Canada for a maximum amount of accurate and efficient service to Canadians, and they cost less than imported machines.

Capacity, ¼-in. to 2-in. pipe. Nipples, ¼-in. to 2-in. Bolts, ⅜-in. to 1½-in. Hand, Belt or Motor drive.

Only one of the many sizes manufactured by us.

Ask the user about Hall machines — we'll gladly furnish you with names.

Prompt delivery from stock.

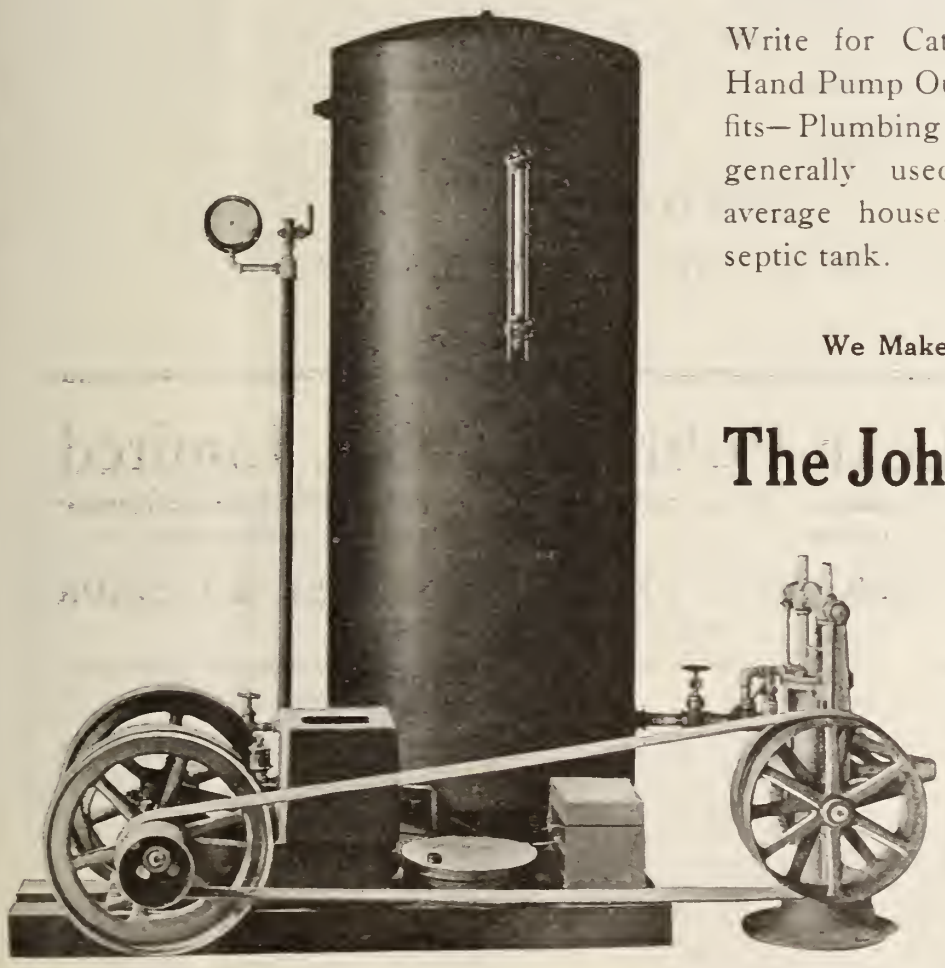
JOHN H. HALL & SONS, Limited
BRANTFORD, CANADA

Stevens' Water Supply Systems

FOR

Town and Country Homes

NONE BETTER



Write for Catalogue illustrating our Hand Pump Outfit—Power Pump Outfits—Plumbing Fixtures and Fittings generally used for plumbing the average house, also for blueprint of septic tank.

We Make Prompt Shipments

The John Stevens Co.

LIMITED

Dealers in

Plumbers' Supplies and Pneumatic Pressure Systems

661 Henry Ave.

WINNIPEG

SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, AUGUST 2, 1915 No. 15

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EDITORIAL.

Well Ventilated Sewers—Just Suppose—The Laws of Health.

The MacLean Publishing Co., Limited

JOHN BAYNE MACLEAN, *President.* ESTABLISHED 1887 H. T. HUNTER, *General Manager*
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SANITARY ENGINEER, PLUMBER and STEAMFITTER of CANADA

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Cable Address: Macpubco, Toronto; Atabek, London, England.

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CANADA—Montreal, 701-702 Eastern Townships Building; Toronto, 143-153 University Ave., Telephone Main 7324; Winnipeg, 34 Royal Bank Building, Telephone Garry 2313.
GREAT BRITAIN—London—The MacLean Company of Great Britain, Limited, 88 Fleet Street, E.C. E. J. Dodd, Director. Telephone Central 12960. Cable Address: Atabek, London, England.
UNITED STATES—New York, R. B. Huestis, 115 Broadway, N.Y., Telephone Rector 8971; Chicago, Ill., A. H. Byrne, 140 S. Dearborn Street. Telephone Randolph 3234; Boston, C. L. Morton, Room 733, Old South Building, Telephone Main 1024.

It's got the Value

Users of the "VITRO"

don't have closet tank troubles.

215,000 NOW IN USE.

The VITRO durability, service and finish stand pre-eminently superior everywhere.

No joints to open up, nor linings to leak.
Only the very best quality of fittings, and all are thoroughly tested.
Every tank is guaranteed.

SOLD BY ALL JOBBERS.

Manufactured by

CLUFF MFG. CO., LIMITED

81-111 STERLING ROAD, TORONTO, ONT.

THE DUNHAM SYSTEM OF VAPOR HEATING

FROM AN OWNER'S POINT OF VIEW:—

Toronto, March 23, 1915.

C. A. Dunham Co., Ltd.,
Toronto, Ont.

Gentlemen:

In the Fall of 1914 I installed your Vapor System in my house, making use of your Traps and special controlling appliances. I have found it most satisfactory in every way, especially so in the quick response to extra heat when required by sudden changes to cold weather. Such times are very annoying where the heating apparatus does not respond quickly.

My house contains twenty rooms, and I find no trouble covering all the space with entire satisfaction. I have no hesitation in recommending your System to anyone looking for satisfaction in this line.

Yours respectfully,
EDWARD PUDDY,
554 Lansdowne Ave.

Mr. Sanitary Engineer:—Let us ask you: Would it be any satisfaction to you personally, and to your business, to have a customer as well satisfied with his heating system as the above? And to know also there would be no calling back to operate the system for him?

It is a satisfaction you can have every time you recommend or install a **Dunham Vapor System.**

Remember we stand back of it and you with a "Service of Satisfaction," which is a guarantee of successful operation.

We will be glad to mail you detailed information and endeavor to show you the advantages of "The Dunham System."

C. A. DUNHAM CO., LIMITED - Toronto, Ontario

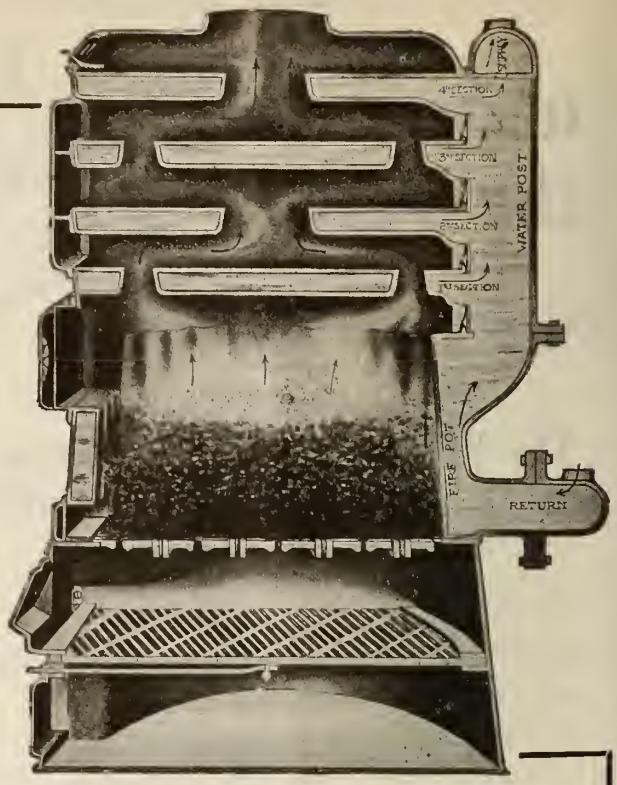
OTTAWA—204 Booth Bldg.
MONTREAL—Room 20, 11 St. Sacrament St.
FORT WILLIAM—Plumbing & Engineering Supply Co.
HALIFAX—Eagar, Coombs & Co., Ltd., McCurdy Bldg.
VANCOUVER—520 Duncan Bldg.
CALGARY—Metals, Limited.
WINNIPEG—405 Tribune Bldg.

"KING" BOILERS

"Made in Canada"

Easier to Sell
Easier to Mount
Easier and Cheaper
to Operate.

Get our **"King Boiler Booklet"** and read it.



Sectional View "King" Boiler.

No. 6 High Base "King" Boiler with Double Shaker.

It tells the story and explains the *"King"* Boiler from ash-pit to smoke pipe.

We'd like to get together with you on this season's work and show you some of our practical plans for co-operating with you.

Our success as manufacturers depends on your success.

Our Complete Line

Includes—"Royal" Round Steam and Water Boilers.
"Royal" Square Steam and Water Boilers.
"Royal" Water and Laundry Heaters.
"Royal" Smokeless Steam and Water Boilers.
"Royal" Fire-box Steam and Water Boilers.
"King" and Imperial Radiators.

We also carry a complete line of steamfitters' and engineers' supplies.

Prompt Service.

STEEL AND RADIATION, LIMITED

HEAD OFFICE: FRASER AVE., TORONTO

304 UNIVERSITY ST., MONTREAL

Showrooms: 80 Adelaide St. E., Toronto

Agencies in all the Leading Cities of Canada

101 ST. JOHN ST., QUEBEC

THE SANITARY ENGINEER

VOL. IX. AUGUST 2, 1915 No. 15

Do You Figure Estimates Free in Your Overhead?

How Many Expenses are There in Your Business Which Should Not be? — Cutting Down on Overhead in Three Ways — What is "Estimates Free" Costing You? — How Much Business Have You to do to Pay Expenses of Estimating Dept.?

NOT very long ago a certain large concern called an efficiency engineer into their establishment to see if there could be any improvements made in the way they were conducting their business. He wasn't one of the most expensive fellows one hears about, but his fee ran up to about $100 a day. Not very much when it's said quick, is it? This efficiency engineer had access to every book, nook and corner he could get into or see. In about a week, $600 worth of efficiency had been mopped up, and the engineer gave his report. What did it amount to? Well, simply this: About half a dozen little things were being done, or being left undone, simple little items which went on as regularly as the tick of a clock. These little items amounted to thousands of dollars in the course of one year. I hear some reader say: "Oh, yes, that might easily happen in a big business, but my little bit of an enterprise don't amount to thousands of dollars all put together." That is just where many thousands of little fellows go wrong. Let us just see how we can prove this latter assertion.

First of all, are you sure your tools are in such shape as will enable your man to do a good tight job in as short a time as possible? Are there too many complaints from your customers about little jobs that have not been fixed as they should have been? Do you do a lot of estimating? How much work do you get from the estimating you do? All these are simple questions.

Benjamin Franklin wrote the following words to those who would be rich:

"The use of money is all the advantage there is in having it.

"For six pounds a year you may have the use of one hundred pounds, if you are a man of known prudence and honesty.

"He that spends a groat a day idly, spends above six pounds a year, which is the price of using one hundred pounds.

"He that wastes idly a groat's worth of his time per day one day with another, wastes the privilege of using one hundred pounds each day.

"He that idly loses five shillings' worth of his time loses five shillings, and might as prudently throw five shillings into the river."

Just a few days ago I dropped into a place where two men were working on a sanitary and heating job. One was cutting some back vents, the other was waiting on the vise: both these men had helpers. They were also using solid dies. I took their time and found that it took the plumber just 15 minutes to cut a thread on one end of a piece of 1½ inch pipe: the second thread was cut in 3 minutes, and some cussing into the bargain. Those men were being paid 45 cents per hour, the helpers 10 cents per hour. Having only one vise on the job resulted in the loss of more time and money in half a day than would have paid for another in half a day.

Let us just see what those two threads really cost. These men and helpers were receiving $1.10 per hour between them, viz., 1 5-6 cents per minute. There was 18 minutes time taken up for the two threads. Overhead expenses added on to this cost would be a least 33 1-3 per cent. allowing nothing for profit; approximately these men cost $1.49 per hour, so that the two threads cost not a cent less than 22 cents per thread.

Bad tools or the lack of an extra vise or some other tool has often resulted in the loss of more money by a long chalk than the total cost of tools. Not only so, but men became discouraged and lost interest in their work. The instance related just proves that there is a great loss of time in the sanitary and heating trades, and the business as a whole has to pay for this loss of time, which often means the loss of many a good contract.

Suppose, for instance, that your tools are not the very best, and you are not getting the quantity of work out of your men that you should. You may not be aware of it, and if you are, are you remedying the matter? Or, are you still spending time sending out estimates free and not getting more than 10 per cent. of the work you tender on?

Has it ever dawned upon some of our readers that the very things which cause the loss of a contract can easily be accounted for by the time that your previous experience warrants you to charge up to the job? Now here comes the idea: Estimates are given free, and from information derived from some of the very best authorities, who are, by the way, among the largest sanitary engineers in Canada, it has been proven that not more than 10 per cent. of the work they estimate on are they able to secure, and this particular firm have up-to-date tools, etc. Looking over a set of plans and blue-prints of a sanitary and heating job, I asked if they could give me an idea of the cost of such a tender, and was told that one job had cost them sixty dollars and they were not very hopeful of getting the contract.

Sixty dollars for one estimate! and it had to be paid for out of overhead expenses. Well now, what does sixty dollars mean? It means that a loan of $1,000 for one year could be procured for sixty dollars, being 6 per cent. on $1,000.

What would happen in this profession if estimating were charged for?

It would mean at least that overhead expenses would drop away almost out of

sight. If that sixty dollars were spent in advertising, in keeping tools in good order, or procuring new, up-to-date tools, these latter would become a live earning asset. Not only this, but the cost of work actually executed would be lower, thus resulting in the securing of more of the contracts estimated for.

Let us consider another instance of estimating: In a certain small town, six sanitary and heating engineers are doing a fairly nice business. A prospective customer came along the other day and informed every one of them that he was about to build a house and wanted a tender on the plumbing. The architect was instructed to send out notice that plans could be seen at his office for the purpose of taking off material and look over, etc. Each sanitary engineer gave a figure on the installation and the highest price submitted was $210. Upon making inquiries the writer found that it took, from the time the estimator left the shop, about four hours each, postage correspondence, etc. Other business had to be neglected in some way or other, and in all 24 hours time had been wasted as it were, because it is very unlikely that any one of those sanitary engineers charged in their time for estimating.

Not a cent less than $1 an hour could be allowed for this, thus the job cost $24 before a "bat was struck." Twenty-four dollars' worth of the very best time wasted on a $210 job. Six dollars per man had to be charged up to profit and loss, or overhead expenses. How much business could one afford to lose rather than have to provide for a six-dollar overhead expense? Now, let us not lose sight of one or two main points: First that no needless expenses are incurred which have to be included, or charged as an overhead expense. Second, that all services rendered, being of some value to the one receiving that service, shall not be charged as overhead, but rather as an account to be rendered.

As long as the public can get something for nothing, it will keep on asking for it. Suppose any one of you wished to build a house and you called upon an architect and said to him: "Mr. Brown, I wish to build a house and desire you to draw a set of plans. If I decide to use your plans I will pay for them, as well as pay you a certain per cent. on the work." What would he in all likelihood say? He would say: "Well, Mr. Jones, I cannot accept your offer. If I prepare plans for you I shall have to charge you for them, whether you build the house or not," and no doubt the architect is right. He is not in the business for the other fellow's benefit only. Services rendered should bear mutual recompense; and the man who wants advice, or any other form of service should be ready to pay for that service, or else do without it. What encouragement can we sanitary and heating engineers hold out to the rising generation? Unless we can show them that this calling is a profession, that if the public desire to know certain things, it will be ready and willing to pay, what is the use of our boys spending years of their lives in acquiring a special technical training? This is not a calling which can be bought over the counter by the pound, and it never will be. We must respect ourselves, the man with the tool bag, or the consulting engineer in our line if we are to expect the public to do so. We must be more than professional, we must be business men, and not rob Peter to pay Paul, which is what is being done. Let us explain:

A sanitary engineer does $50,000 worth of business in one year; he gives out estimates to the value of $60,000.

NOTICE TO READERS.

We have quite a number of readers who send in questions to be answered but fail to give us their address. We would like to receive addresses as a guarantee of good faith, also to enable us to answer their question privately. For instance, we had several questions which showed the answer was urgent, because of its very nature, and in such a case the questioner has had to wait in many cases over two weeks and more, and often a question is such that it requires more particulars. Therefore we respectfully ask our readers to give us their full address, which is not necessarily for publication.—Editor.

$20,000 worth of business comes to him in an ordinary way because of the good reputation he has established. $30,000 worth he gets by estimating; $30,000 worth he estimates on but does not get. What has happened if he has profited by his year's business? He estimates on $60,000 worth of work, is only awarded $30,000, therefore, **the work he is awarded has had to pay for all the time lost on work he was not awarded.** Now, readers, is that fair? We must not think for one moment that the $20,000 worth of work which came to him because of his reputation can bear any of this cost, simply because it came to him without having to incur any estimating cost.

We will suppose that the cost of estimating on the whole of the $60,000 worth of work cost 5%, that would amount to $3,000, and we will suppose that he could have secured the $30,000 worth of work without "estimating free," he could have done the work for $27,000 and still have been as far ahead as he was under the old system. You see readers, the customer's paying him $30,000 actually paid for all the expenses of the estimating department.

In conclusion I want to impress every reader with one big thought and that is, that no charge should appear under overhead expenses which can be charged to anyone. If big overhead expenses must be, then provision must be made to meet them. Overhead expenses are added to by every tick of the clock. They have been the ruin of thousands of people because provision has not been made to meet them.

A young man starting out in business should weigh up very carefully this matter of overhead, he should start right by refusing to estimate free. He will do far better by making personal calls upon prospective customers and creating a favorable impression by doing good work and making fair charges, than by wasting his time running after the architect and speculative builder and giving estimates free.

SPEED.

From Colliers.

The gasoline engine, which made possible the flying machine and the automobile, has arisen and come to perfection within the lifetime of men who are still in college. Will there be any other wonders equal to this for the generation who are babies now to see? One day last month, in Indianapolis, a young man moved upon the earth at the rate of ninety miles an hour for several hours. Barring an occasional stretch of a few minutes on a few miles of railroad, this is the fastest motion of a human being on the surface of the earth. For time measured in hours, this generalization is certainly true. Compared to what this modest young American did, the chariot races of Rome were the awkward playthings of babies. Ralph De Palma's official record on the Mercedes car was 500 miles in 5 hours 33 minutes and 55½ seconds, the average speed being 89.84 miles an hour. The minute mechanical perfection that has been achieved by the automobile makers during the past few years is suggested by the fact that only four years ago, in 1911, the record was 74.59 miles an hour. In the race this year the tenth car beat the fastest car of 1911. Among these ten cars, six were American built. The young man who did this unprecedented thing at Indianapolis is Italian born. He came to America when he was six years old, never drinks alcohol, never smokes, and leads the life of clean restraint which makes his nerves and muscles possible. Compared to him, the fat Neros who used to plug around the Coliseum were pikers.

Getting After New Business

Sanitary and Heating Engineers in Large Towns and Cities are "Seeking" and "Finding" Business—Becoming Better Salesmen Every Day—Quite a Large Number are Realizing an Improvement in Their Business.

Sixth Article of this Series.

FOR months The Sanitary Engineer has been urging its readers to use more printers' ink, and advertise. To-day sanitary and heating engineers are doing more advertising than ever before in the history of the trade, particularly those doing business in the country. Upon making extensive inquiries we have found that business in the small country towns is in a far better condition than in the large centres.

Much can be said to the credit of the sanitary and heating engineer in the small town. Below we reproduce a number of advertisements which are appearing in the local papers in towns where these businesses are being conducted.

J. McIntyre pays attention to the advertisements he is running in a very commendable manner. He changes his copy frequently, which reflects great credit on him, and no doubt he will reap a benefit from the campaign he is carrying on through the local paper.

All expert advertisers or advertising agencies will tell you that the first thing to be considered when preparing an advertisement is, to catch the attention of the readers, at once. The next point is that every advertisement should either give or ask for something, some information for instance.

These arguments are proved by the following. Suppose you want to say something to a man you meet on the street every day, you first endeavor to attract his attention. You may accost him by bidding him good day. You then tell him you have something to say to him. There now, you have his attention, he listens, and half your battle is won. You have given your message; whether an impression has been made upon him remains to be seen. Suppose you do not think you have, you immediately try to get his attention again, do you recite the same words over to him? Why of course not, you try another plan. Now suppose you have an advertisement inserted in your local paper and you allow the same copy to be repeated time and time again, with no change, you are practically repeating the same words over again. What would a person think of you if you were to stop him and repeat the same words to him every time he met you on the street.

We have every confidence in the man who advertises. We have no confidence in any person who allows the same copy to run week in and week out, month by month or year by year and it is very encouraging to see how sanitary engineers are becoming alive to up-to-date methods of going after business. Messrs. Rice & Co., Bowmanville, believe in changing their advertisements and so does Frank Light. We have various copies of both these firms advertisements.

PREVENTION
FAR BETTER THAN
CURE

So says current medical authority. Our modern methods and "Standard" Plumbing Fixtures are the ideal of prevention by their assurance of sanitary, therefore, health-security.

Ask for estimates
C. C. HARRIS
BRIGHTON

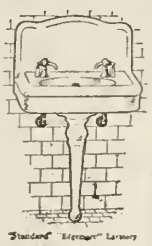
PLUMBING & GAS FITTING

Sole Agents for
Ideal Gas Ranges
Hot Plates, Gas Burners, and Gas Water Heater
A full line of Chandeliers, Mantles, Globes, etc.
PLUMBING—See our fixtures before buying.

Frank Light

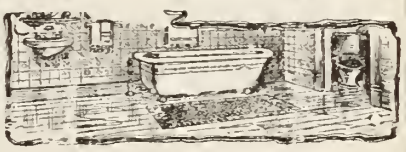
IF you are about to build or remodel, investigate thoroughly the plumbing fixtures you install. Insist on the *best* only—even though they may cost a little more. It will pay you in the long run as the service they give is permanently efficient.

"Standard"-Sanitary Plumbing Fixtures insure every requisite of a sanitary and efficient equipment and their installation ends plumbing annoyance and expense.



RICE & CO.
Opposite Post Office — Bowmanville

"EVERY AD" SHOULD EITHER ASK FOR OR GIVE SOME INFORMATION.



PLUMBING & HEATING

Contracts, Repairs, Alterations, Odd Jobs, nothing too large or too small.

Service Prompt — Estimates Given
Charges Moderate

PHONE 66
RICE & CO., King St
Plumbing and Heating Contractors

What is Home Without a Bathroom?

Enjoy the Comforts of a Real Home
BY INSTALLING A BATHROOM.

You need not necessarily live in town to enjoy all these comforts.

Ask Us to Tell You

Our Plumbing Fixtures are the finest made in the British Empire. Our work is done up to a standard.

Bell Phone 60 — **J. McINTYRE** — Ind. Phone 64
SANITARY HEATING AND PLUMBING ENGINEER

Take Your Watch to a Blacksmith For Repairs?

NOT MUCH

YOU SEE AN EXPERT

Have Experts plan the Plumbing and Heating of Your Home

ALL ADVICE FREE

Bell Phone 60 — **J. McINTYRE** — Ind. Phone 64
SANITARY HEATING AND PLUMBING ENGINEER

Note the changes of advertising copy. No advertisement should be allowed to appear too often without being changed.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 9.

ARTICLE 9.

Ventilation (continued).

FROM the foregoing articles the necessity for ventilation is apparent. The question may arise why, since in the average home there is no provision made for systematic ventilation, harmful results are not quickly noticeable. In an air-tight room with a cubical contents of 1,000 cubic feet one person in less than an hour would by his exhalations cause the air to reach the maximum limit of impurity allowed by sanitarians. The person would eventually die through lack of oxygen, which would be changed in breathing to carbon dioxide. Rooms and houses are fortunately, however, not air tight. Air can get in or out through the cracks of doors and windows and even to some extent through the walls themselves, and whenever the temperature of the room is above or below that of the surrounding air the room will receive some ventilation. Large rooms are preferable as they act as reservoirs of air, but, on the other hand, small rooms are generally found in the cheaper houses where the construction is more open and allows more ventilation.

Prof. Carpenter says: "Even in the case of direct heating where no air is purposely supplied for ventilation there will be a change of air by diffusion of the air in the room which the writer has found practically met by an allowance equal to one to three changes in the cubic contents per hour." Another authority thus sums up the question of ventilation of residences in cold weather: "Heating by hot air furnaces and by indirect steam or hot water radiation will generally provide sufficient ventilation for private residences, especially if the principal rooms are provided with fire-places or ventilation flues." In the summer, ventilation can be accomplished through screened doors and windows.

From the foregoing it follows that in the ordinary home in the country or in the suburbs of the city there will generally be sufficient ventilation although no special provision is made for it. The problems of ventilation are met, however, in crowded tenements, schools, factories and offices and if not correctly solved ill health is sure to result.

Admitting that in the majority of homes sufficient fresh air is generally obtained, this fresh air, especially in the case of houses heated by hot air, is generally too dry. The result is discomfort to the people breathing it, and the expense of extra fuel to make the dry air feel as warm as a moister air, which latter is a better conductor of heat. European engineers advise a humidity of from 60 to 70 per cent., but in America it would seem that a smaller relative humidity is permissible and 50 per cent. is taken as normal.

Some hot air furnaces would seem to be constructed with insufficient provision for the evaporation of water to moisten the hot air. Very frequently also the keeping of the furnace water pan full of water is neglected. For various reasons, therefore, evaporating pans for water to be placed near hot air registers or hot water or steam radiators are of value. This is a point which does not seem to have been realized fully in the past by either the manufacturers or possible users of such articles, for they are not frequently met with in the home. Boiling water in houses heated with

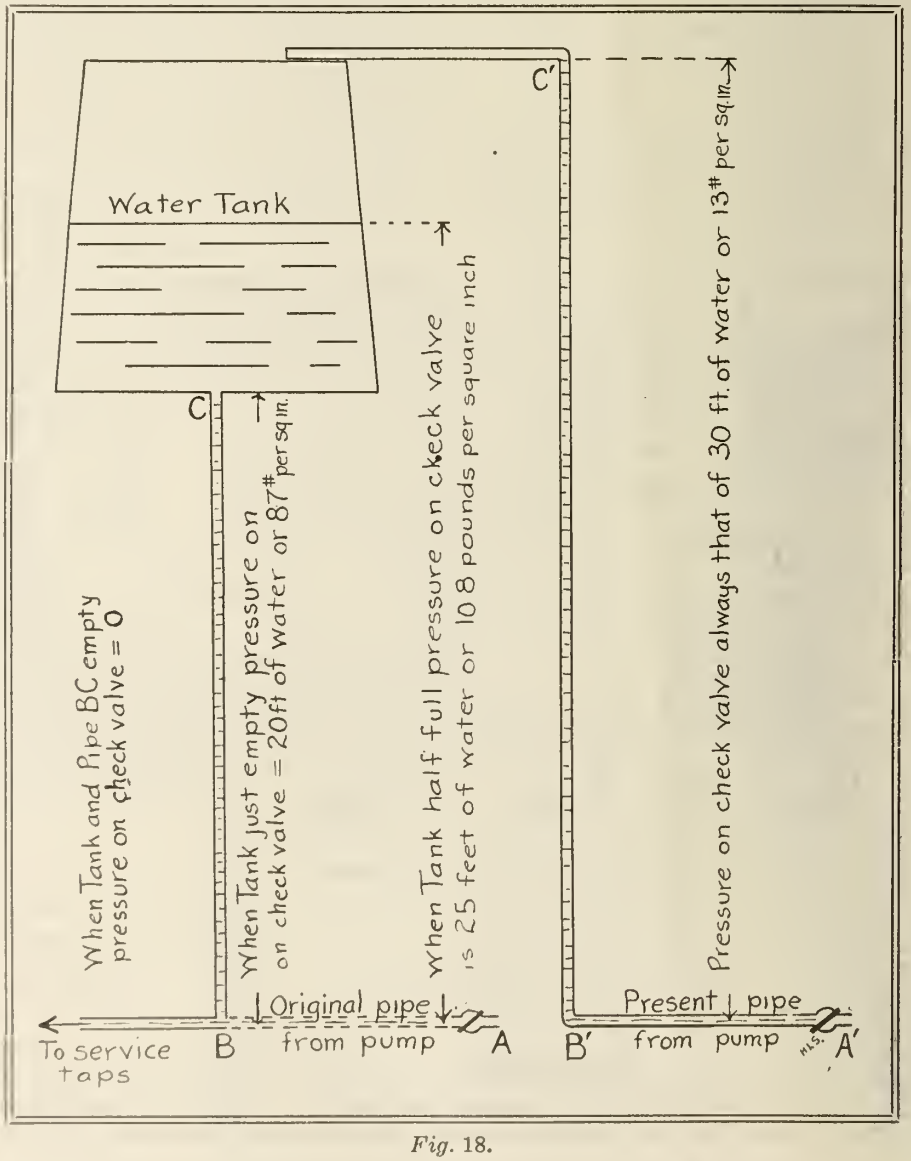

Water Tank
C'
C
When Tank and Pipe BC empty pressure on check valve = 0
When Tank just empty pressure on on check valve = 20ft of water or 8.7# per sq in.
When Tank half full pressure on check valve is 25 feet of water or 10.8 pounds per square inch
Pressure on check valve always that of 30 ft. of water or 13# per sq in.
Original pipe
Present pipe
To service taps
B
from pump
A
B'
from pump
A'

Fig. 18.

stoves is a means of keeping the air sufficiently moist.

Water.

Pure water is probably the greatest essential in promoting proper sanitary conditions.

Water covers more than two-thirds of the earth's surface and is very essential to all animal and vegetable life. When pure it is a colorless liquid composed only of hydrogen and oxygen and expressed chemically as H_2O. Pure water in bulk appears blue but when colored by other matters may be of various colors from white as milk to black as ink. It is a poor conductor of electricity. Though slightly compressible it can generally be considered for practical purposes to be incompressible. Water will dissolve a great many substances and that is one reason why it is very seldom found pure. When pure it is neither alkaline nor acid and is free from odor and taste.

Water is most dense at a temperature of 4° Centigrade or 39.2° Fahrenheit. If pure it then weighs 62.424 pounds per cubic foot. However, in most water there is nearly always organic and inorganic matters in suspension or solution and the inorganic matters cause the weight of water per unit of volume to be slightly increased. The weight of a cubic foot of water is therefor very nearly 62.5 pounds. This is a convenient figure and can be used in ordinary calculations. An Imperial gallon is taken as weighing 10 pounds and one cubic foot as containing 6¼ gallons.

It is important for the sanitary engineer to understand the fundamental laws or principles relating to water at rest and in motion. Hydrostatics is the science that treats of liquids at rest and hydraulics is the name of the science that deals with the flow of water. Various hydraulic tables are published that may contain sufficient information for the engineer when dealing with water problems but certain errors may be made if there is not a full understanding of a few important fundamental principles.

A liquid differs from a solid in that it exerts not only a downward pressure due to its weight but it exerts a pressure in all other directions as well. It is a fundamental principle of hydrostatics that the pressure at any point in a liquid is equally great in all directions. The pressure at a particular point increases as the depth or head of water above that point increases.

It should be well noted that pressure at a point depends only on the head and is independent of the quantity of water. A vertical pipe one inch in diameter and filled to fifty feet in height with water will give the same pressure per square inch at the base as a stand pipe filled with water, twenty feet in diameter and fifty feet high. Of course the total pressure on the base of the stand pipe is greater.

The object of Fig. 18 is to illustrate how a misunderstanding of the laws of hydrostatics resulted in a more than needless expense. In this figure a water tank 10 feet in height and 20 feet above the ground is shown. The water was originally pumped to the tank through pipe ABC. The owner who made his own installation decided that when the tank was full the pressure of all that water was very hard on his check valve. He changed the supply pipe to pipe $A_1B_1C_1$, as shown, with the result that now there is always a pressure on the valve due to a head of 30 feet of water. Originally it was only that great when the tank was occasionally full. When the tank was just empty the pressure was that due to only 20 feet of water and if pipe BC was also empty the pressure on the check valve was zero. The owner's mistake was due to the fact that he considered the pressure on the check valve was due to the weight of water in the tank instead of to the head of water above the check valve. Practically all the weight of water in the tank is held up by a tower (not shown in the figure).

The relation between pressure and head of water causing that pressure is given by the equation:

p=wh where
p=pressure
w=weight of water
h=head of water

If p is in pounds per square inch and h is in feet then p = .434 h and h = 2.3 p, when the weight of a cubic foot of water is taken as 62.5 pounds.

Fig. 19 is drawn to aid in an explanation of the law governing the flow of water. A body falls if unsupported on account of the attraction of the earth otherwise known as the force of gravity. Water flows from a high point to a lower for the same reason. If we can imagine a large cylinder from which all the air has been exhausted so that the

(Continued on page 30.)

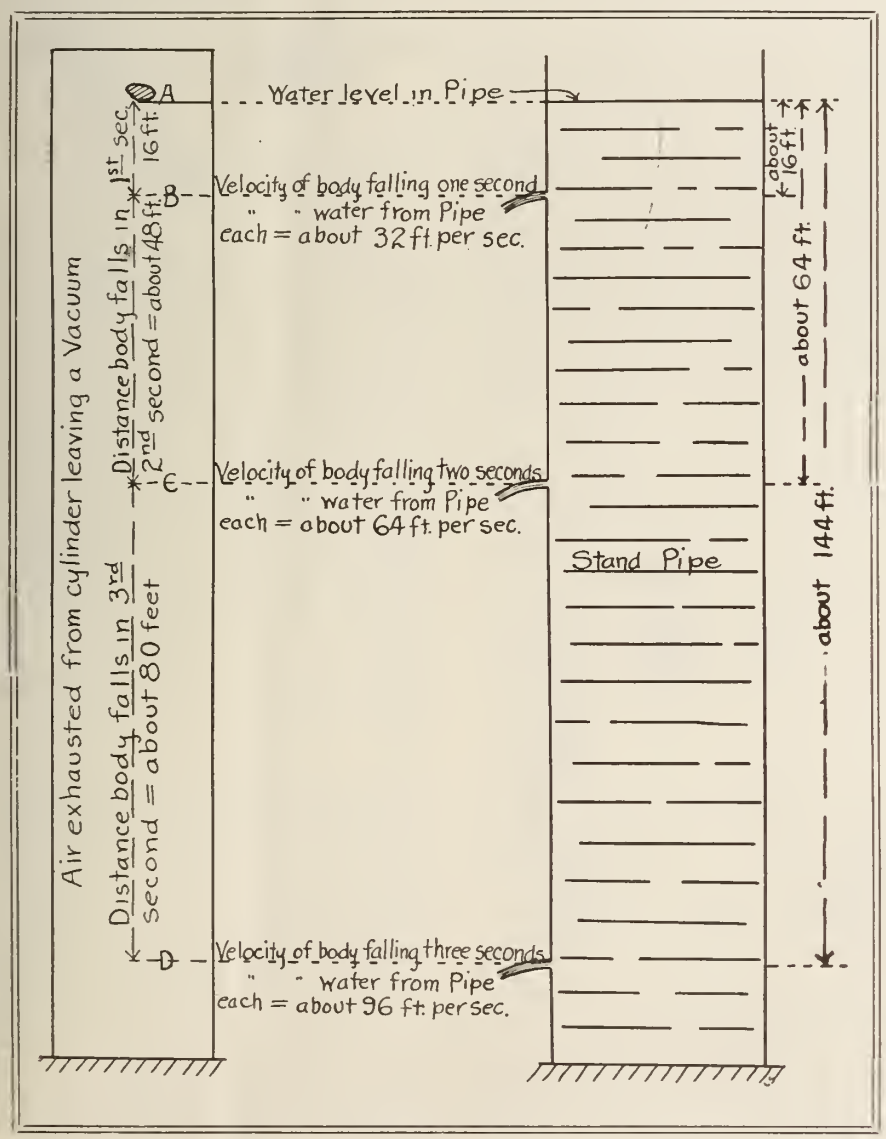
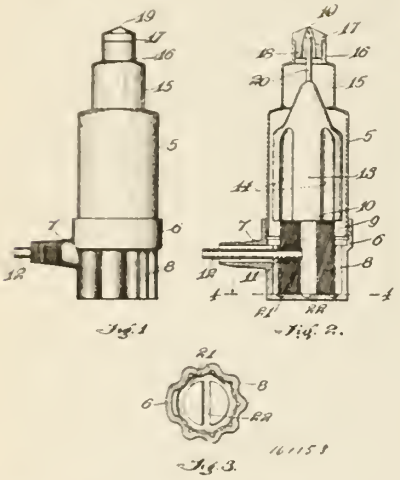

Air exhausted from cylinder leaving a Vacuum
A
Water level in Pipe
about 16 ft.
about 64 ft.
about 144 ft.
Distance body falls in 1st sec. 16 ft.
B
Velocity of body falling one second
" " water from Pipe
each = about 32 ft. per sec.
Distance body falls in 2nd second = about 48 ft.
C
Velocity of body falling two seconds
" " water from Pipe
each = about 64 ft. per sec.
Stand Pipe
Distance body falls in 3rd second = about 80 feet
D
Velocity of body falling three seconds
" " water from Pipe
each = about 96 ft. per sec.

Fig. 19.

New Canadian Patents

Andrew Jackson and Frank C. Drescher, co-inventors, both of Chicago, Illinois, U.S.A., 9th March, 1915; 6 years. Filed 27th August, 1914. Receipt No. 242,652.

Claim.—1. An air vent valve for radiators comprising a float chamber having an inlet, and an outlet provided with an escape port, an expansible member located in the bottom of the chamber, a float subject to the influence of said



member, and a valve carried by the float, said valve controlling the outlet port.

2. An air vent valve for radiators comprising a float chamber having an inlet, and an outlet provided with an escape port, the bottom of the float chamber having intercommunicating grooves, an expansible member mounted on the grooved bottom of the chamber, a float subject to the influence of said member, and a valve carried by the float, said valve controlling the outlet port.

3. An air vent valve for radiators comprising a float chamber having fluted side walls at the bottom, and said chamber having an inlet, and an outlet provided with an escape port, an expansible member located in the bottom portion of the chamber and surrounded by the aforesaid fluted wall, a float subject to the influence of said member, and a valve carried by the float, said valve controlling the outlet port.

4. An air vent valve for radiators comprising a float chamber having an inlet and outlet provided with an escape port, an expansible member located on the bottom of the chamber, said member having a central longitudinal aperture, and a lateral branch aperture leading therefrom, a conduit extending from the inlet and passing through the lateral aperture and opening into the longitudinal aperture, a float subject to the influence of the expansible member, and a valve carried by the float, said valve controlling the outlet port.

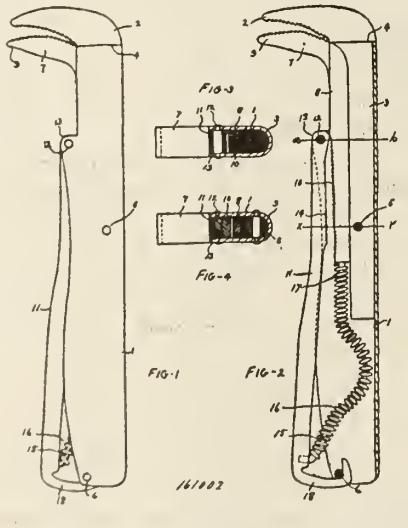
5. An air vent valve for radiators comprising a float chamber having an inlet, and an outlet provided with an escape port, an expansible member seating on the bottom of the chamber, a float seating on top of the expansible member and subject to the influence of said member, and a valve carried by the float, said valve controlling the outlet port.

* * *

Margaret Langley McCarthy, assignee of Hiram A. McCarthy, both of Petersburg, Ontario, Canada, 2nd March, 1915; 6 years. Filed 20th January, 1913. Receipt No. 219,380.

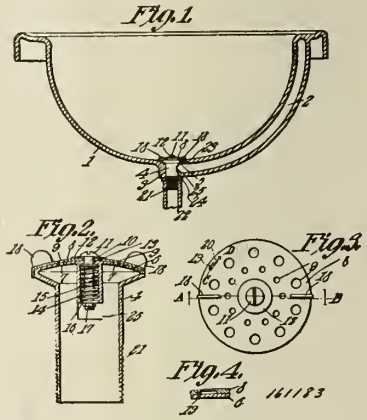
Claim.—1. In an adjustable wrench, an outer hollow handle having a rigid jaw member secured thereto, a jaw member slidably arranged in said hollow handle, spring means for holding said adjustable jaw member toward the rigid jaw member, and a locking lever pivotally connected to said member and adapted to engage and hold said adjustable jaw member securely.

2. In an adjustable wrench, an outer hollow handle having a rigid jaw member secured thereto, a jaw member slidably



arranged in said hollow handle and formed with a toothed front face, a locking lever pivotally secured in said handle and having a toothed portion adapted to engage the toothed face of said adjustable jaw member, and spring means for releasing said locking lever and returning the adjustable member to its forward position.

3. In an adjustable wrench, a handle portion formed of sheet metal bent into U-shape in cross section, a head rigidly secured to said handle, an adjustable jaw member slidably arranged between the sides of said handle, a locking lever pivotally secured to the sides of said handle to the outside of said adjustable member and adapted to engage and lock said adjustable member, a spiral spring



secured on one end to the adjustable member and at the other end to said locking lever.

4. In an adjustable wrench, a handle portion formed of sheet metal bent into U-shape in cross section, a head rigidly secured to said handle, an adjustable jaw member slidably arranged between the sides of said handle, a locking lever pivotally secured to the sides of said handle to the outside of said adjustable member and adapted to engage and lock said adjustable member, said handle having an arc-shaped hook member at its outer end, and a pin secured to said handle and adapted to engage said hook member to limit the outward movement of the locking lever.

* * *

Wilmer P. Hall, Cordele, Georgia, U.S.A., 9th March, 1915; 6 years. Filed 18th January, 1915. Receipt No. 247,133.

Claim.—1. A strainer of the class described including a member having a flared dome-like end provided with apertures, a disc fitting snugly upon said end and having apertures movable into and out of register with the apertures in the end, a pivot device extending through the disc and said end and into the member, and a spring engaging said pivot device and the end of the member for binding the disc upon said end, there

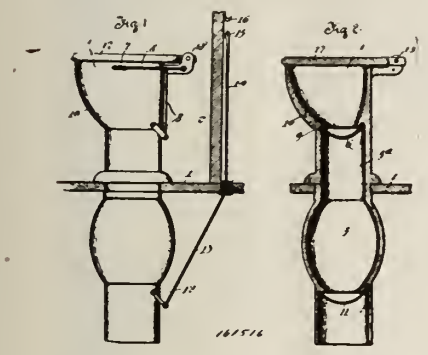
being an inlet opening within the member at a point between the ends thereof.

2. A strainer of the class described including a member having a flared dome-like end provided with apertures, a disc fitting snugly upon said end and having apertures movable into and out of register with the apertures in the end, a pivot device extending through the disc, and said end and into the member, and a spring engaging said pivot device and the end of the member for binding the disc upon said end, means within the member for housing the spring, and co-operating means upon said end and disc for limiting the movement of the disc relative to said end.

* * *

William E. Somerville, Coal City, Illinois, U.S.A., 23rd March, 1915; 6 years. Filed 2nd January, 1915. Receipt No. 246,587.

Claim.—1. A device of the class described, comprising a pair of communicating receptacles arranged one over the other, and each having a discharge opening, a closure for each opening to retain the contents in each respective receptacle and forming a sealed compartment



of the lower receptacle between the closures, and a manually controlled operating means for each closure, said operating means being separate and distinct from and operable wholly independent of each other.

2. A device of the class described, comprising a pair of communicating receptacles arranged one over the other and each having a discharge opening, a closure for each opening to retain the contents in each respective receptacle and forming a sealed compartment of the lower receptacle between the closures, a manually controlled operating means for each closure, each of said operating means being separate and distinct from and operable wholly independent of each other, and means for securing the lower closure in an open position.

3. A device of the class described, comprising a pair of communicating receptacles arranged one over the other and each having a discharge opening, a closure for each opening to retain the contents in each respective receptacle and forming a sealed compartment of the lower receptacle between the closures, a manually controlled operating means for each closure, each of said operating means being separate and distinct from and operable wholly independent of each other, the operating means of the lower closure being inaccessible to a person using the other closure operating means, and means for securing the lower closure in an open position.

4. A toilet comprising a pair of communicating receptacles arranged one above the other, a sealing closure for each of said receptacles adapted to form a sealed chamber between the closures, and a separate operating means for each of said closures, said operating means being positioned distant from each other to prevent the user of one from using the other, and whereby the lower closure can be closed to form said sealed chamber between the closures and leaving the upper closure free to be operated without opening the lower closure.

* * *

Ira A. Mann, Pittsburg, Pennsylvania, U.S.A., 9th March, 1915; 6 years. Filed 16th December, 1914. Receipt No. 246,103.

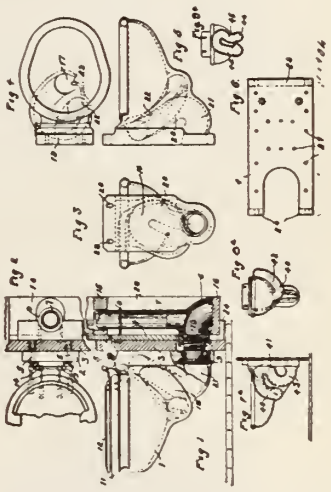
Claim.—1. In combination in a wall closet construction, a bowl having an enlarged portion at its rear side provided with a bearing face adapted to engage the wall and with an outlet therethrough and to the rear of the centre of the bowl orifice, means for supporting the bowl upon the wall, and a syphon passage lying entirely in the bowl, such passage having its short leg lying to the side of the orifice of the bowl and forward of the rear wall thereof and having its long leg at its lower end bent to the rear and leading through the said outlet, the said long leg lying in the said enlarged portion.

2. In combination, a bowl having a bearing face adapted to engage the front face of a supporting partition, an outlet pipe extending through the partition, a metal bearing plate of an area approximating that of the said bearing face and lying opposite the said bearing face upon the rear side of the partition and having its lower edge bifurcated to fit over the outlet pipe, transverse beams arranged to support the plate independent of the partition, and means extending through the partition for securing the bowl rigidly to the said bearing plate.

3. In combination, in a wall closet construction, a bowl having a bearing shelf adapted to engage the front face of a supporting partition, an outlet pipe at the rear of the wall provided with an upwardly extending vent pipe, a metal bearing plate lying behind the partition opposite the bearing shelf, means for supporting the bearing plate from the vent pipe, and means extending through the partition for securing the shelf to the bearing plate.

4. In combination, in a wall closet construction, a bowl having an outlet and a bearing shelf adapted to engage the front face of a supporting partition, piping to the rear of the partition communicating with the said outlet and having a rigid connection with the bowl at such point, a metal bearing plate lying behind the partition opposite the said bearing shelf, means extending through the partition for securing the upper portion of the bearing shelf to the bearing plate, and a connection between the upper portion of the bearing plate and the portion of the said piping lying above the outlet from the bowl.

5. In combination, a wall bowl, a piping system, including vertical piping and a lateral discharge connection from the bowl to the vertical piping by which the bowl is partially supported from the piping, and a tension connection above and independent of the discharge connection and extending from the bowl to the vertical piping.



6. In combination, a wall bowl provided with a bearing shelf adapted to engage a partition and extending above the body portion of the bowl, a piping system back of the partition, and connecting means extending through the shelf and connected to the piping for partially supporting the bowl, the outer ends of the said connecting means at the front of the shelf being formed so as to act as hinge supports.

* * *

Clarence E. Safford, Detroit, Michigan, U.S.A., 2nd March, 1915; 6 years. Filed 21st March, 1914. Receipt No. 236,220.

Claim.—1. A radiator comprising a series of sections formed with annular bosses on their faces and integral flange

(Continued on page 22.)

Some of the Sanitary Engineers, Friends, Wives, and Families of Toronto, Who Took in the Picnic Recently.

Toronto Society Annual Picnic

A Most Enjoyable Time—Manufacturers and Supply Men Send Their Quota—Games Indulged in by Young and Old, Lean and Fat.

THAT all work and no play makes Jack a dull boy, is just as true with regard to sanitary engineers as any other human beings, and in spite of the fact that Tuesday, July 13th, turned out wet and clouds overcast the city for several hours, the Toronto Society of Domestic, Sanitary and Heating Engineers held their annual picnic at the Island. Strange to say, that on arrival at the grounds there had been no rain and those friends who travelled over earlier in the day were surprised at the lateness of the arrival of the party, which was delayed by the storm which raged over the city. However, it did not take long to make up for lost time. Teams were made up for the inside and outside baseball games, and all the players took great interest in the game. The names of the four teams were as follows:

OUTSIDE GAME.

Representing Mfrs. and Supplymen.

Messrs. Wheatley, Yeats, Glen, Bell, Child, Downs, Qua, Rodgers and Needham.

The "Prize Winning Girls" at the Picnic. Mrs. W. H. Cooper, and Baby, Toronto, in Centre.

Sanitary Engineers.

Messrs. Wright, Gentle, Swanston, Menzie, Abbott, Max, Cracknell, Byrnes and Griffith.

The inside game was played by the following members of manufacturers and sanitary engineers:

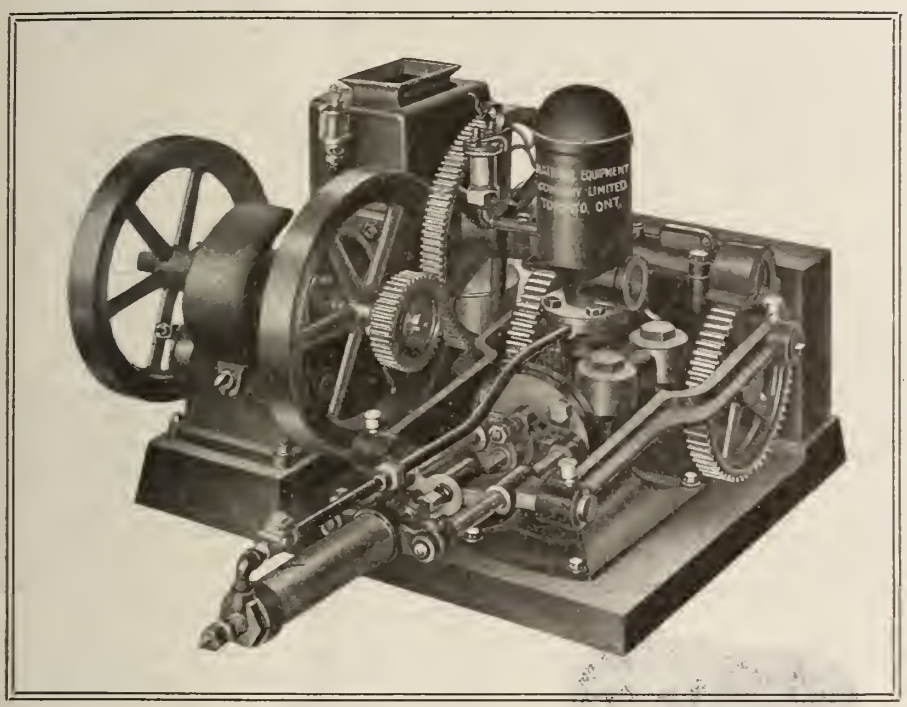
(Continued on page 29.)

The Prize Winning Boys at the Picnic.

New Sanitary and Heating Goods

A NEW PUMPING OUTFIT.

This is the day when manufacturers, jobbers, or sanitary engineers are doing one of two things: They are either going behind or going ahead. They are not at a standstill. No such a condition exists and never did. Nothing can be at a standstill; it must be either working or depreciating. There are manufacturers who, while not using time in making money, are making improvements in their products. They are spending money in an endeavor to keep their products just a little ahead of times. The latest pump to come to our notice is that of a complete gasoline engine-driven unit, to be known as series 150, and is being placed on the market by the National Equipment Co., Ltd., Wabash Avenue, Toronto. This company make some very novel claims for this line of pumps, a few of which are as follows: The smallest size weighs approximately 250 lbs. complete; engine and pump is on one solid cast iron base; battery box and all electrical connections are made. It is fitted up with a simply-constructed circuit breaker, which operates by the pressure in the tank. This little circuit breaker makes it possible for the engine to be started and left alone until the pneumatic tank is full, when it instantly stops the engine. The smallest unit consists of one one-horsepower engine and pump, which will deliver 350 gallons of water per hour on a consumption of less than one pint of gasoline. As stated before, there are several sizes, pumping capacity of which ranges from 350 gallons per hour with a one-horse power engine, to 2,000 gallons per hour, requiring a 2½-horse power engine. Any sanitary engineer can fit them up; no adjustments to be made. All that is required to put them in operation is to connect the suction pipe to the well and the delivery pipe to the pneumatic tank. Further particulars may be procured by writing for Bulletin No. 94 to The National Equipment Co., Ltd., Wabash Avenue, Toronto.



New pumping unit, gasoline engine driven, Series 150.

MODERN SELF-FEEDER NOVELTY FURNACES.

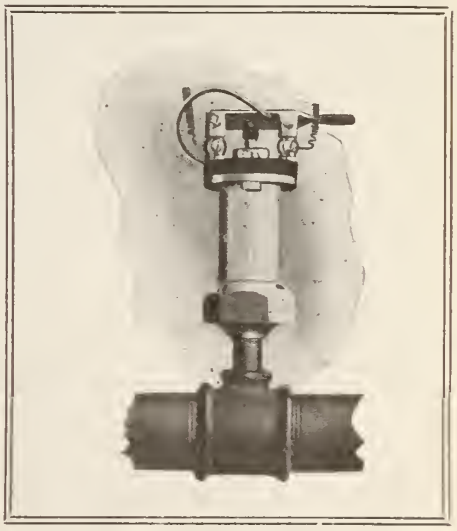
Toronto Furnace and Crematory Co., Ltd., Toronto, offer a new product to the trade, in the "Modern Novelty" self-feeder furnace, here illustrated. The makers of the new furnace have applied the principle of the magazine or self-feeder, which they claim eliminates 50 per cent. of the handling and labor required to maintain a steady and constant flow of heat at all times during every hour of the day or night. They claim that with the new furnace one full charge of coal will give a constant volume of heat for 48 hours.

Modern Novelty Furnace.

The new furnace is made in five sizes. Complete descriptive matter can be secured from the manufacturers.

NEW EXPANSION BOLTS.

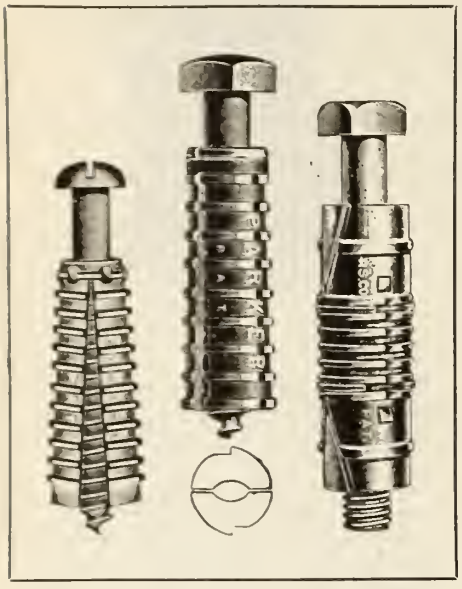
"It's the little things that count these days, isn't it?" "Of course," is the reply we hear. We could never get a complete hour if we were just one second short, and so on goes the whole story. No fitter in the world could ever whittle off a wooden plug, drive it home and guarantee that at some day it would not dry out or prevent the radiator or other fixture from falling down. There are thousands



Enlarged view of automatic circuit breaker which goes with Series 150.

of wall radiators out of line to-day because they were fastened to the wall by the use of wooden plugs.

Expansion bolts are little things doing big jobs. Expansion bolts never dry out. Expansions are little things which make big and little jobs permanent. Yet how many sanitary and heating engineers carry a stock of these little **big time-savers?** Quite a number of styles are being manufactured and put on the market and one of the latest type to come to our notice is manufactured by the Parker Supply Co., 517-525 West 45th street, New York, from whom further particulars may be procured.



New Parker Expansion Bolts for all Purposes.

NEW THERMO SYPHON TRAP.

The problem of successfully eliminating air from heating systems is one which has always commanded considerable attention and those who have had experience in this connection will highly appreciate the thorough manner in which our apparatus releases all air and non-condensable gases without permitting the escape of heat or vapor. Automatic Relief creates a positive circulation and greatly facilitates the draining of systems.

One of the greatest fields for business at this season of the year is the reconstructing of heating systems. Thousands of tons of coal is wasted because of poor heat circulation. If a radiator cannot be freed from air and water quickly or if there is a waste of steam on account of the steam passing straight through the radiator, then there is a heat loss.

Such a condition should not be in existence at this day, when we realize the large number of specialties which can be procured to eliminate steam waste.

The New Lytton Thermo Syphon Trap.

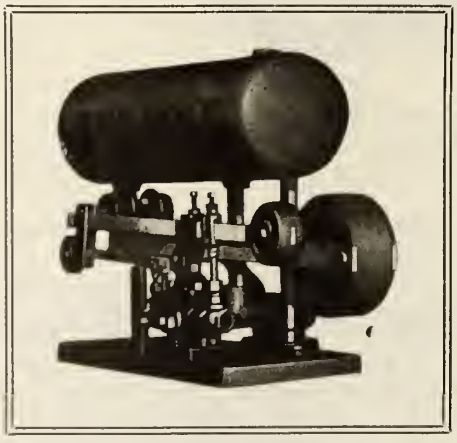
Not only do such specialties as these prevent waste of steam, but they also increase the efficiency of the whole heating system of which they are a part.

The Lytton Manufacturing Corporation of Franklin Virginia are issuing a quantity of useful literature describing the working of the trap shown above, Those desiring to know more about these specialties may do so by writing to above address.

COLE TRAPS.

All heating engineers are interested in steam traps, some more than others. But all agree that unless a steam heating system is kept free of air and water there is trouble. Not only does the system not work but there is a great deal of fuel going to waste.

The G. W. Cole Co., condensation engineers, 838 Dundas street, Toronto, realize the great need for fuel saving



New Cole Trap.

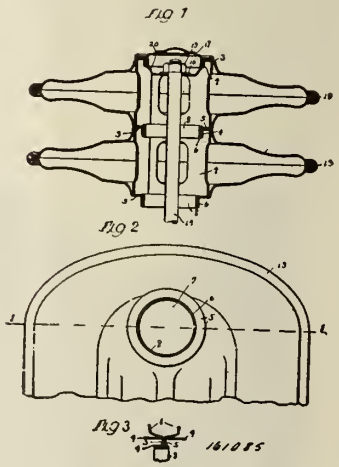
and increased efficiency of steam heating plants, and have placed on the market a line of steam traps for this specific purpose. Further particulars may be procured from the above address for the asking.

NEW CANADIAN PATENTS.

(Continued from page 19.)

at the inner edges of the bosses, the flange of one section extending into the flange of the adjacent section, perforated rings within the sections and within the bosses and of substantially the same diameter of said bosses, and of greater internal diameter than the external diameter of said flanges, and means connecting the outer halves of the outer sections and transmitting pressure thereto, said pressure forcing the outer edges of said bosses of adjacent sections into contact.

2. A radiator comprising a series of sections, each formed with openings



and annular bosses and flanges surrounding said openings, the outwardly extending flange of one section extending into the inwardly extending flange of the adjacent section, and non-erosible bushings mounted within the outwardly extending flanges, the ends of said bushings being rolled back over the edges of said outwardly extending flanges.

3. A radiator comprising a plurality of sections formed of flexible metal and with openings and flanges surrounding said openings, the flange of one section extending into the flange of the adjacent section, and a non-erosible bushing within the inner flange, the ends of said bushing being rolled back onto the edges of said inner flange.

4. A radiator comprising a plurality of sections formed of flexible sheet metal and provided with male and female flanges and projecting annular bosses, a ring within each section of greater diameter than the flanges and surrounding them and engaging the interior of the outer edges of the bosses, and a tie rod extending through the flanges for securing the sections together and causing the rings of adjacent sections to force the outer edges of the bosses of adjacent sections into contact with each other.

THE SANITARY ENGINEER

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EDWIN NEWSOME - - - - *Editor*

Circulating amongst Sanitary, Heating and Ventilating Engineers, Gas Fitters, Sanitary Inspectors, City Engineers, Boards of Health, Architects, etc.

AUGUST 2, 1915

Well Ventilated Sewers

THE following appeared in one of the daily newspapers of Halifax, N.S., some time ago. It may interest our readers from various standpoints:

PLUMBING AND HEALTH.

"It is not surprising, perhaps, that old ideas concerning the causes of disease survive a long time after these ideas have been generally outgrown or discredited. All the same it is a little disconcerting to find that typhoid fever can still be complacently attributed to bad plumbing. When we read that 'insufficient laws regulating plumbing and sanitation in Virginia, Maryland and the District of Columbia are largely responsible for the high typhoid rate and the prevalence of other diseases in the two states and the District,' and again that 'much of the fever and other forms of disease with which the health authorities are constantly wrestling is caused by noxious gases and vapors emanating from neglected or defective pipes in the homes of our people,' we are inclined to rub our eyes and ask ourselves if the education of the community is really proceeding at the pace we sometimes like to believe. *The assertions quoted above, however, were reported as made at the Association of Plumbers, Gasfitters and Steamfitters, which met in Richmond, Va., and not at a convention of health officers or physicians.*

As the Journal of the American Medical Association points out, typhoid fever—or any other fever — is not caused by bad smells, and the small quantity of the gases of decomposition *found in well-ventilated sewers has never been proved to exert any injurious effect whatever on health.* A connection between plumbing and health has been shown to exist at just one point. Plumbing is of value to public health only so far as it removes human excreta from the immediate neighborhood of dwellings and so does away with the danger of fly-borne typhoid and other infection which arises from allowing infectious material to accumulate."

It may be all very well to say that sewer gas, etc., is not injurious, but the fact remains that no one wishes to breathe any kind of odor from a drain or sewer. What one person would resent in an odor may not be resented by another, but all odors which are emitted from drains, sewers or excreta are obnoxious to all. No human being will ever assert that odors from such sources as named are not obnoxious.

This Halifax paper draws the inference, however, that because these assertions quoted above were made at some association of Plumbers, Gas and Steamfitters, there can be very little truth in the statements. This same paper then goes on to quote from some medical journal. If the quotation is correct, it certainly does not reflect very much credit upon the medical fraternity. In the first place, the medical men very seldom interest themselves in the matter as to whether main sewers or drains are or are not "well ventilated." The fact of the matter is very few main sewers are ventilated at all. In the city of Toronto, no ventilation of sewers is provided for. Montreal health board is trying to prevent the proper ventilation of sewers by enforcing the use of a main house trap. Thousands of towns and cities all over the world do not ventilate their sewers. What is the medical fraternity trying to get at?

Next, the medical journal is quoted as saying that "Plumbing is of value to public health only so far as it removes human excreta from the immediate neighborhood of dwellings, and so does away with the danger of *fly-borne typhoid and other infection.*"

This is another proof of the weakness, yea carelessness of the medical fraternity. The very idea of allowing excreta from a patient suffering from typhoid fever to enter any plumbing system, or public sewer is ridiculous. If the medical fraternity were anywhere near as perfect in their labors as the sanitary engineer, no such infected excreta would be allowed to enter the public sewers. If there had been no typhoid germs dumped into the water of the river Ottawa there would have been no typhoid epidemic. This medical journal admits that gases from sewers which are not ventilated are dangerous. What about the gases which are emitted from these unventilated sewers? They rise up through the manholes and settle on the ground, the dust absorbs them and the people consume dust. So, when we come to consider the hundreds of miles of sewers which are not ventilated and which the medical faculty admits should be ventilated, and when we remember that this same medical faculty in re-modelling plumbing by-

laws, refuse to allow sewers to be ventilated and when we see the way in which the further pollution of these non-ventilated sewers by allowing excreta from typhoid patients to be discharged into them is still permitted, thus finally polluting our drinking water, we think it is about time the medical fraternity gave sanitary engineers a little more say in these matters.

One thing is certain. If sanitary and heating engineers had their way there would be about 60% of the medical faculty looking for a job. About all the latter can do is to cure us when we are sick: the sanitary engineers believe that prevention is better than cure.

Just Suppose

SUPPOSE every plumber in days gone by had become thoroughly disgusted at the way the people railed at the craft and had lost heart. Just suppose they one and all had quit the job and become carpenters, what would have happened? Suppose the good old-time plumber had said, "I'll plumb no more. I get abuse at every turn. I know I'm full of faults, but who isn't? I'm the joke of everybody on earth. If I want a helper I have to go to the little rascal on the street who doesn't care one rap about the trade except for the dollar there is in it. The kid thinks, because he hears of the exorbitant charges made for work done, that his boss must be a millionaire," and so on goes the story.

Well now, let us cease supposing and get down to hard facts.

The old-time plumber is past and all glory to his memory. He is now a sanitary engineer. He is an engineer of the highest order, he must know more in a general way of the laws appertaining to applied mechanics than any other kind of tradesman. In fact he must be an expert in many things. Now, just suppose, instead of snubbing this latter day craftsman, that the general public had given him the same consideration that has been meted out to every other craftsman, such as carpenters, cabinet makers, mechanical as well as civil engineers, where would the wheels of progress be to-day? Why, we should have sanitary water supply systems in our cities, and sewage disposal plants would be in a greater state of perfection. Heating and ventilation would have arrived at a much higher degree of efficieney than is the case to-day. Last, but not least, sanitary and heating engineers would be better business men as a whole. The public have had and are still getting more than they are paying for. The coming sanitary engineer will be a better business man than ever before. He will get out of the mire himself. He will not resent the opinion of the public, but will strive, as, in fact, he is now striving to show that "good did come out of Nazareth." The next generation of sanitary engineers will be gentlemen of education, they will be sons of the present day sanitary engineers, they will be students of the technical schools, and will be men of learning. These coming men of the craft will be better paid, they will be respected not because of anything the public has done for them, but on account of what they have done of their own initiative, and the credit will be theirs. Yet how different might conditions have been if the public had, once in a while, given that good old-time plumber a pat on the back and appreciated the service rendered, rather than grumble at the price.

The Laws of Health

ONE can scarcely realize the great strides which have taken place in the sanitary and heating business, unless we begin to look back at some of the installations which in past times seemed to be the height of perfection, or read what some writer or other says about matters of health.

The late Elbert Hubbard was one of the finest champions of modern sanitation. Several years ago he wrote the following short epistle.

"The laws of health are very simple, and for the most part are understood by all people of average intelligence.

"One reason why we do not all have good health is not because we are ignorant, but because inertia has us by the foot. The trouble is in our heads—we lack will.

"If high degree of health were the rule, instead of the exception, we would cease to talk about it. We discuss health, because pallor, languor, and breaths that almost derail trolley cars ride, Godiva-like, adown the times, and put us on the binkereens.

"In one respect at least, we have made head. It is no longer necessary to order people to keep personally clean—humanity's hide is now daily soaped, soaked and scrubbed. Whereas, in the days of Good Queen Bess, who they say was not very good, the courtier who took a bath in his altogether between November and May was unknown. Even fifty years ago, the man who ordered a bath at a tavern was regarded as reckless of both health and money. It was an event! The water had to be heated in the kitchen and carried in buckets to his room, and a porter stood by to see that the carpets and plaster did not suffer. The danger of catching cold through bathing, except in hot weather was considered very great, scientific plumbing is less than forty years old. The famous Fifth Avenue Hotel did not have a single room with a bath attached when it was built. Now everybody bathes, and we have ceased to talk about it. Will the time ever come when we will cease to advocate outdoor exercise, deep breathing and kind thoughts? I hope not."

The same thoughts come to us when we wonder whether the proper heating and ventilating of our homes will be the rule. Only a couple of years ago was such a thing mooted as making it compulsory to provide proper ventilation, to-day such thoughts fill our minds. We know that houses, factories and offices are being built which are not provided for in this way. But there are also some buildings which are properly equipped, though such equipment is looked upon as superfluous, just as a bath or lavatory was only a few years ago. About the only relic in existence which still holds sway in the sanitary and heating business is the wiped joint, but even that is on its last lap. A few years from now and it will be a thing of the past.

THE MAN who starts at the bottom is the man who learns the secrets that revolve around the prineiple on which the institution is founded. Dig deep enough toward the bottom of a thing and you will find the rock on which it stands. Most great men, men of influence and character, men who have acquired fortunes, have once been poor. The man who has developed a great business, or the man who has developed great character, the man who has amassed great wealth, is the man who laid the foundation with his own trowel.

Practical Course for Sheet Metal Workers

ARTICLE No. 19 OF SERIES

By CHARLES SEIVERS

IN the two problems shown here, we have in Fig. 1 a tee pipe, or junction between two pipes of equal diameter, and in Fig. 2 a junction between two pipes of equal diameter, but not at right angles to each other.

To develop patterns for Fig. 1 draw a side view as shown by A-B-C-D-E-F-G-H. On the line A-H draw a half section of the branch shown by the semicircle A-M-H. Divide this half circle into a number of equal parts, as shown by the figures 1-2-3-4-5, etc. At right angles to A-H draw lines from these points, extending them beyond B and G. On end, as at E-F, draw another half section or section of pipe, as shown by circle K. Divide portion of circle K into same number of equal parts, as section on line A-H. At right angles to E-F draw lines from these points, extending them until they intersect lines drawn from corresponding numbers on the section at A-H. Connect the points obtained, obtaining the line B-L-G, which is the line of intersection between the two pipes. To lay off the pattern of branch or part outlined by A-B-L-G-H, draw two parallel lines, as N-N and O-O. At one end draw a line at right angles to N-N, joining it to O-O, as N-O. From these lines, N-N and O-O, set off the spaces shown, 1-2-3-4-5, etc., on half section A-M-H, repeating these measurements so as to make the circumference complete. Draw lines connecting 2-2-3-3-4-4, etc. With the compasses or dividers measure distance from A-H on line numbered 1 to point L, and mark off this distance on lines numbered 1 on stretch-out, using, say, N-N as the line to measure from; measure from A-H on line 2 to its intersection with line L-G or L-B. In this case both are the same, and set off on spaces marked 2; measure from A-H on the remaining lines 3-4 and 5, and set off in the same way on corresponding lines on stretch-out. A line drawn through points on stretch-out thus obtained will give outline of pattern for the part of tee outlined by A-B-L-G-H.

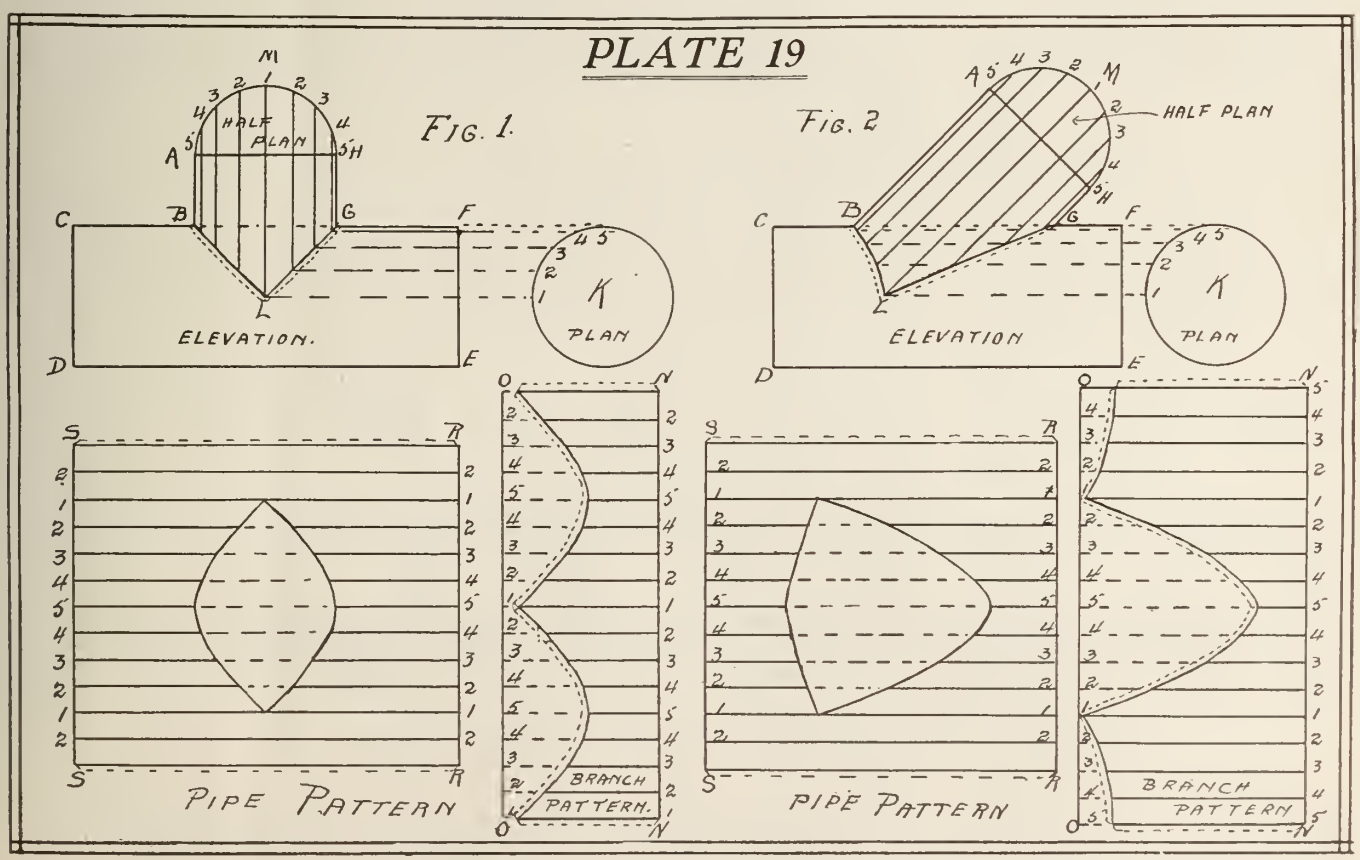
To obtain the outline or shape of the opening required in main part to receive branch, draw two parallel lines, as R-R and S-S, and draw a line at right angles, joining them as R-S. From this line set off at least half of the circumference of pipe, as shown by the figures 1-2-3-4-5, etc. Working from the line F-E, measure the distance from the line F-E on each of the lines drawn from the section K on the end to their intersection with corresponding points on lines B-L-G, setting off distances obtained on lines 5-4-3-2 and 1 on the lines numbered 5-4-3-2-1 on stretch-out. A line drawn through points thus obtained will give the outline of opening required to receive branch.

The problem in Fig. 2 is worked out in the same manner as described for Fig. 1.

Care should be taken to allow material for lapping at the joint, as shown by dotted lines at B-L-G, which will require to be turned down to fit the pipe.

Allowance must also be made for locking or seaming the joints at N-N and O-O on both patterns.

The sharp tongue is a weapon that is always loaded, and is often more dangerous to the owner than to the target.



Expansion and Contraction Explained

A Subject of Great Importance to Sanitary and Heating Engineers—A Few Simple Examples Given as Applied to the Trade.

THE old time plumber had very little time to devote to the scientific side of his calling. He had to grope along as best he could. Many problems was he confronted with because of the lack of time and opportunity to study. He knew very little of the science of expansion and contraction, even though both were a source of trouble to him at times. In explaining the laws of expansion and contraction one must begin by first knowing that there are three classes into which all substances may be divided, viz., liquids, solids and gases. For example, a liquid is a substance of some definite size, but no physical shape. It can be poured out of one vessel into another and varies in weight according to density as well as temperature, and it is incompressible. For instance, water at 60 degrees Fahr., say 1 pint, would be 1 pint plus one-tenth if the temperature were raised to 210 degrees Fahr.

A solid is a substance or body which to some extent can be compressed under great weight, and has some definite size and shape. It is a substance which can, as it were, support itself on a base, without surrounding support, such as a piece of wood, stone, iron, lead, etc.

Gas is a compressible substance; it will fill any vessel irrespective of shape. It varies in weight, as is seen by the following table:

TABLE I.

Cubic ins.	Substance	Weight	
44.4	Hydrogen	1	Grain
44.4	Oxygen	16	Grain
44.4	Nitrogen	14	Grain
44.4	Chlorine	35.5	Grain

There are quite a variety of gases, all of which vary in weight. Some are illuminating as well as explosive, others the very reverse, for instance, coal gas and acetylene gas are both illuminating gases as well as explosive. Carbonic acid gas (CO_2) is not an explosive gas in every sense of the word; it is not an inflammable gas, will liquefy at 300 lbs. pressure, and is better known as benefied carbonic acid gas. These latter items are simply mentioned to show the natures of one or two gases.

Action of Heat or Cold on Metals.

If our reader is really desirous of seeing with his own eyes what takes place when either heat or cold is applied to, say a bar of metal, he may do so by procuring a number of bars of various metals, say one of each, iron, copper, zinc, lead and aluminum, all exactly the same size thickness, width and length. The best size is 1 inch x ¼ inch x 1 foot. Square the ends, then place each on the top of a stove, first measuring the length with a pair of dividers or calipers, then when bar is heated take the length again. It will be surprising to see how much a piece of iron will expand.

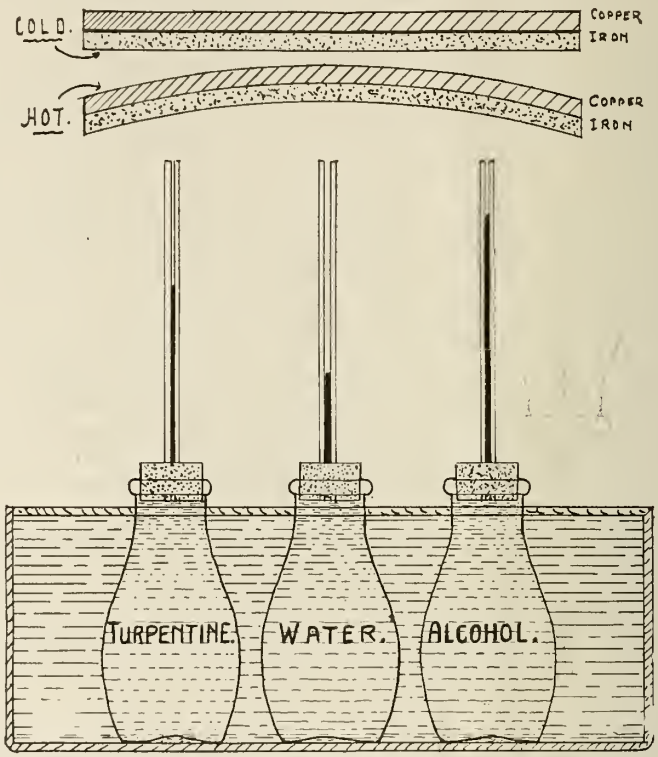


Fig. 1 shows two pieces of metals which vary in expansion when subjected to the same degree of heat. Fig. 2 shows three liquids with a variation of expansion.

Just to illustrate how friendly the law of expansion and contraction is to the worker, let us take the case of a threaded joint. Some time ago a reader of The Sanitary Engineer asked if yarn should be used in making up a threaded joint. The Sanitary Engineer replied that no such stuff should be used. For instance, when making a threaded joint, good threads are the first essential. Then these threads should be screwed together properly. If a fitting is being screwed on a pipe, the fitting will warm up. This is caused by friction; friction causes heat. Heat causes the fitting to expand, and when cool will be tighter than at first. No joint made up in this way can possibly leak providing the threads are good ones.

Another instance may be cited. When making up a range connection between range boiler and water front, as few stiff joints should be made as possible and the threads should not be too tight. It is well to have a tight job first of all, but if too tight the joints are apt to become strained, while if there is a slight leak here and there it will be apt to take up.

A tubular boiler does not need to be absolutely dry tight when first being built, because when heat is applied, joints say at the tubes, will very likely become strained and leak afterwards. The writer was once called in to examine a boiler and found quite a number of tubes leaking; the boiler had been condemned, but when heat was applied there were no signs of a leak.

Solids expand when some form of heat is applied to them. They have a variety of expansive properties. For instance, take the bars of metal we have mentioned, and drill a number of holes through them so that they can be bolted together, any two, say the iron and copper bar. When they are both cold or of the same temperature they will, of

course, both be the same length and straight, but if heat is applied they will bend; the copper will bend outward and the iron inward (see Fig. 1), thus proving that the copper has expanded more than the iron; even the holes in the copper will show signs of strain. The same of aluminum and iron, zinc and iron, or zinc and copper.

Liquids, too, expand differently; that is, some liquids expand more than others. As an example take three dairy cream bottles; fill one with water, one with turpentine and another with gasoline or alcohol, excluding all the air. Cork them up tight and place a small glass tube about 1 foot long through the cork (see Fig. 2); let the tube extend into the fluid about half an inch. Then place all three bottles into a vessel of cold water and put some heat under the larger container. Then observe the liquids expand by the contents of the small bottles rising up the tubes as the water in the large vessel becomes warmed.

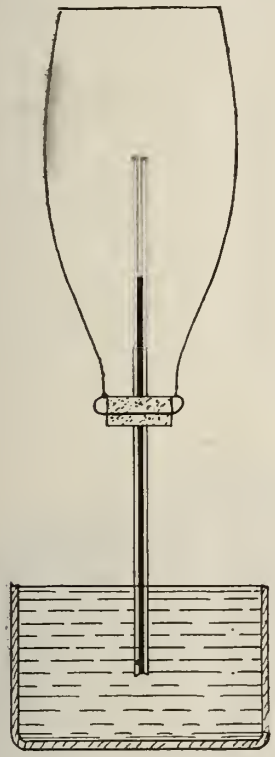


Fig. 3 showing the contraction of gases, which creates a slight vacuum drawing the water from the lower open vessel up the tube.

Next try the following experiment to illustrate the expansion of gases (see Fig. 3). Take an ordinary paper bag and place it in a refrigerator for a few moments. Have a piece of string ready; tie the mouth of the bag up while in the cold air in the refrigerator. Then bring it out and hold it before a fire. The bag will expand to almost bursting point.

Another very interesting experiment along the same line can be had by procuring a quart milk bottle, fill it with hot water in order to heat the bottle; have a cork with glass tube about a foot long ready. Cork up the bottle while hot and suspend it over a vessel containing water, allowing the tube to enter the water. Get a cloth saturated with cold water and wrap it around the bottle. The water in the lower open vessel will rise up the tube as the hot air in the bottle cools, thus proving the contraction of gases. Next allow the bottle to cool and take a cloth saturated in hot water and wrap it round the bottle, placing the tube into the water in the open vessel, and bubbles will rise in the open vessel, thus showing the expansion of gases (see Fig. 4). Various gases act differently under varying conditions. For instance, coal gas will liquefy in extreme cold weather, and when such piping is being laid underground in cold climates, it should be laid below the frost line: or, if pipe is being installed in a building which is not heated, it should be covered with good pipe covering and run with a slight pitch downward to one point; at this point there should be provision made to hold water (see Fig. 5).

Carbonic acid gas CO_2 if compressed to over 300 lbs. pressure per square inch will liquefy. This gas is used in the preparation of soft drinks. Carbonic acid gas is charged into long steel tubes, and is sold by weight. When being charged the tubes are placed on a scale and the gas is compressed into them until the scale registers a certain weight gross.

No trade requires to study the general law of expansion and contraction more than does the sanitary and heating engineer, particularly where the climatic conditions are such as are experienced in Canada. Just to cite one or two instances to prove this statement: An Old Country plumber very seldom cracks a soil pipe hub in winter except perhaps in Scotland, by pouring his lead too hot, because in winter there is very seldom extreme cold such as is experienced in Canada. Thousands of hubs are cracked by having the metal too hot for pouring a joint in winter. Very seldom is a hub cracked in summer time.

No heating engineer who knows his business would connect an ordinary radiator with a stiff joint. He would make a swing connection to take care of expansion. The same when running a long main or high riser; provision would have to be made for expansion in some way or other. Vacuum heating systems depend upon sudden and efficient contraction of heat to create a vacuum, and thus it can be seen how necessary it is that every person engaged in this profession should have a general knowledge of the laws of expansion and contraction, and their relative value or otherwise to the trade.

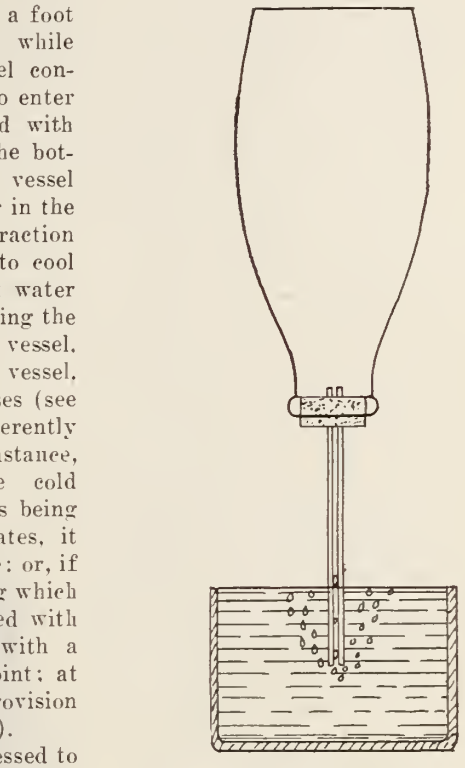


Fig. 4.—Expansion caused by applying heat to cooler body of air or gases. Note bubbles.

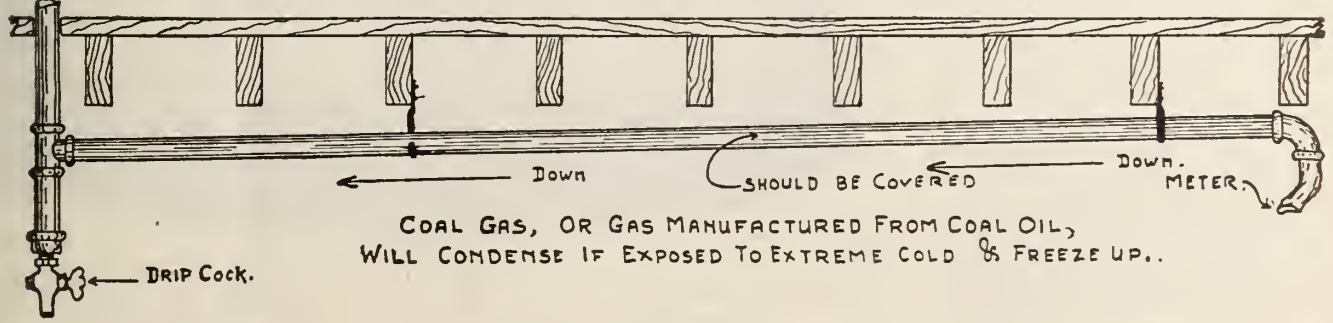


Fig. 5.—Gas mains installed in cold places will result in coal gas condensing. This action is really contraction of coal gas, and should be provided for in manner shown.

How to Sell Gas Water Heaters

The Sale of Gas Water Heaters Must be a Matter of Efficiency and Economy. Maximum Service, With a Minimum of Cost. To be a Successful Salesman, One Must Know all About His Product.

NO specialty to date, which does not run into big money, has so wide a field as has the gas water heater. Time was when to have such an appliance was deemed a luxury; to-day it is a necessity, and rightly so. Dr. Hodgett of the Conservation Commission told the writer that he was looking forward to the day when he would be in a position to condemn every house or building wherein humanity dwelled, in which there was not a bath installed. Said he, "the W.C. is necessary and so is the lavatory, but a bath is essential, more so than either. If the skin of our body is not kept clean, we can not hope to enjoy good health, and if bathing is essential, then it follows that a copious supply of hot water is necessary. Now, how can we hope to have lots of hot water at all times unless we have a gas water heater in our home? The writer talked gas water heaters to a friend of his to such an extent that he, the friend, declared he felt as if the dirt was laying inches thick on his skin, until he had a gas water heater installed. This has now been done. Well now, if, as we have shown, every house should be equipped with a gas water heater, the next question is, how can we get the public to buy them?

Simply by fitting up attractive displays, displays that have some originality about them. These displays need not be of an elaborate nature, but they must be simple and effective. A thorough knowledge of the heater is also very essential, all with a view of attracting the attention of either the passerby or the person who can be persuaded to enter your store.

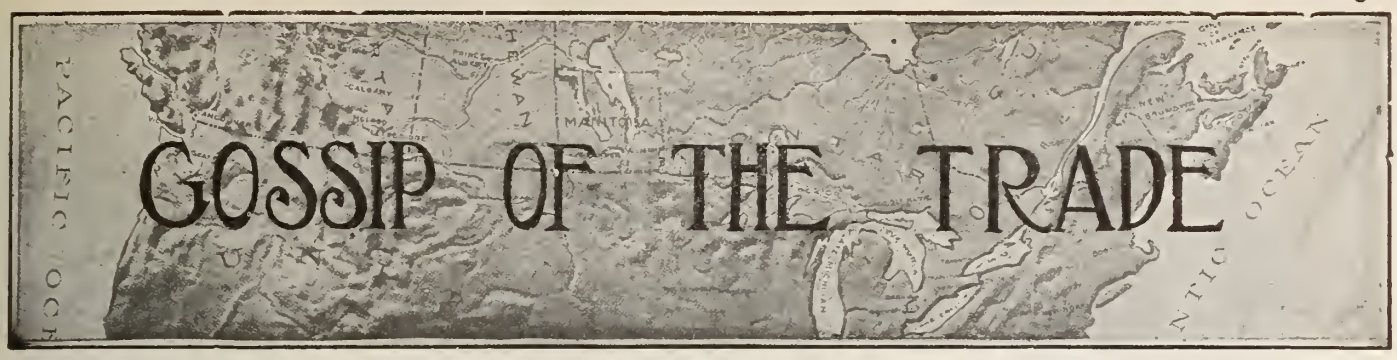
One of the most novel ideas in the way of an attractive yet simple and effective window display is shown herewith, that of the window of Messrs. McDonald & Willson, Queen street east, Toronto. This window is fitted up with a pedestal lavatory on one side, and on the other with a Pittsburgh instantaneous gas water heater. As can be seen, the doors are open, which shows the flame when the gas is lighted. The passerby is asked to "start something."

On the outside of the window is fitted a self-closing bibb-cock underneath which is fitted a small funnel to carry away the water when the passer-by turns on the tap. The moment the tap is turned on, the large burners can be seen to light and hot water flows just as long as the tap outside is kept open. The moment the tap is closed the gas automatically closes off. This same display can also be operated from the inside of the window by turning on the tap at the lavatory.

Not a great number of years ago such a display would have been an utter impossibility, but to-day there is no limit to the possibilities of the gas water heater. Such being a fact, there is no reason why every sanitary and heating engineer should not push their sale to the limit, particularly when the building trade is almost at a standstill in all our large centres.

A few years ago the electrician was heard to say that gas was out of the question; that it was receiving its death blow by the introduction of electricity. However, the very reverse is the case, and while we all admit that electricians and electrical engineers deserve great credit for the splendid strides they have made in their line, gas and gas engineers, too, have accomplished and are still accomplishing great things. Gas to date can be applied to everything which electricity has ever done or can do, but electricity has not been adapted to scores of purposes for which gas fuel is being used. Thus we wish to emphasize the great possibilities of gas as a commodity of universal domestic utility, and the scope it gives for utilization to the advantage of the sanitary and heating engineers.

McDonald & Willson, 12 Queen St. East, Show a Splendid Gas Water Window Display, "The Passers-by" are asked to "Start Something."



THE BOARD OF HEALTH RECOMMENDS NEW SEWER.

The Board of Health, of Woodstock, Ont., held a meeting recently, and discussed the matter of a new sewer which is badly needed on Riddell Street.

The sewer is to run north from a point near Vincent street to the corporation limits. Several cellars in the vicinity have been flooded but when it came to getting a petition signed it transpired that there were not sufficient property owners interested in the matter to carry the proposition through. The Board of Health looked into the matter and decided that the sewer should go down in the interests of the public health. It was so recommended to the council meeting Monday and arrangements were made to go on with the work.

DISPOSAL PLANT FOR EDMONTON, ALBERTA.

A contract between the City of Edmonton and the Midland Construction Company has been signed. It calls for the construction of a sewage disposal plant at the foot of 101st street. The contract price is in the neighborhood of $30,000, and as soon as this is under way, steps will be taken to have the injunction taken out by Francis Clare, restraining the city from emptying any additional sewage into the river modified, so that the many applications on file in the city offices for sewer connections can be completed.

WEYBURN TO HAVE NEW SEWAGE DISPOSAL PLANT.

Nothing is receiving more attention at this time than the question of the sanitary disposal of sewage, by our towns and cities.

Not many years ago any stream, lake or waterway was the final place to deposit sewage and any sanitary engineer who had condemned such a practice would have been looked upon as a man of too advanced ideas. The same with the fixtures in our homes. A fine up-to-date bathroom equipment was looked upon as merely a luxury. To-day it is an absolute necessity.

The town of Weyburn is one of the many Canadian towns to have an up-to-date sewage disposal plant installed, and is to be complimented upon the venture. Manufacturers or heads of large concerns should first of all investigate the method of sewage disposal before establishing factories, manufacturing plants, etc., just as the up-to-date housewife will first of all look over the plumbing of a house before she will take her family into a home to live. One is the sanitation of the town or city. The other is the sanitation of the home.

RETURNS TO CITY.

The friends of E. T. Needham will be pleased to know that his company, The Canadian Wolverine Co., Ltd., Chatham, have transferred him to Toronto.

E. T. NEEDHAM,
Toronto representative of Canadian Wolverine Co., Ltd., Chatham, Ont.

It will be remembered that "Ed." gave up his business some time ago and was appointed representative of the aforenamed company in British Columbia. We wish him all success on his new territory and hope the good work which he started going in B. C. will still go on. Mr. Needham made some very good friends in B. C. and will no doubt be missed there.

TORONTO SOCIETY PICNIC.

(Continued from page 20.)

Sanitary Engineers.

Messrs. Farthing (the man with the grip), Maxwell, Hillier, Smythe, Alexander, Clapperton, Shephard, Benson, Ellis and Downs.

Manufacturers and Supply Men.

Messrs. Hurlburt, Rogers, McDonald, Hadley, Quinn, McBride, Miriam, Ferguson and Conway.

In both events the sanitary engineers played a swift game. Having previously been up against the painters and decorators, and the fact that it leaked out that the painters had given the manufacturers a few pointers as to the failings of the sanitary engineers, made the latter even more determined to come out on top at the picnic. The final results, however, were that the manufacturers won the outside game by a neck. While the sanitary engineers were the winners of the parlor game.

The most enjoyable part of the picnic was the children's games. The girls and boys participated in various races, ages ranging from 4 years to 16 years, and apart from the winning of special prizes, every one of the children were given some slight token of the picnic. The weather turned out ideal. Ice cream and other refreshments were handed round and at 6 o'clock a splendid banquet was partaken of. At the close, a drawing competition was pulled off with much gusto. This was purely a ladies' affair, and five prizes were awarded.

After the banquet the men joined in several races, viz., single men's race, married men's race, travellers' race, plumbing inspectors' race, handicap race for members of the Toronto Society only. Two beautiful silver cups were awarded the winners of this race, which was in reality an event of note. The prizes were won by the following: 1st prize—T. B. Smythe, Toronto; 2nd prize—W. S. Ramsay, Toronto. These two prizes were donated by the B. O. T. Manufacturing Co., Ltd., 159 Richmond street west, Toronto, and will long be appreciated by the winners.

PRACTICAL SANITARY SCIENCE.

(Continued from page 17.)

air can have no buoyant effect or cause any friction then a body falling from A (see Fig. 19) will under such conditions after one second be falling with a velocity of a little over 32 feet per second. The nearer the centre of the earth the greater is the force of gravity so the velocity of a body after falling for one second is greater at the poles than the equator and is less on mountain tops than in valleys. An average value for the velocity of a falling body at the end of the first second is generally taken in hydraulic calculations as 32.16 feet per second and is represented by the letter "g."

The longer a body falls the greater its velocity becomes and consequently the greater the distance it falls in succeeding seconds. At the end of one second the body has fallen about 16 feet as its average velocity is 16 feet per second, being zero at the beginning and 32 feet per second at the end of the first second.

If the stand pipe shown in the figure be tapped at 16 feet below the surface of the water then the velocity of the water flowing out will be 32 feet per second or the same velocity as the water or any other body would have attained in falling in a vacuum through that distance. In the same way if the stand pipe is tapped 64 feet below the surface of the water the velocity of the water flowing out will be 64 feet per second.

The relation between velocity and the head of water causing that velocity is given by the equation:

$V = \sqrt{2gh}$ where

V = velocity in ft. per sec.

g = velocity given by gravity in one second or 32.16 feet per second.

h = head of water in feet.

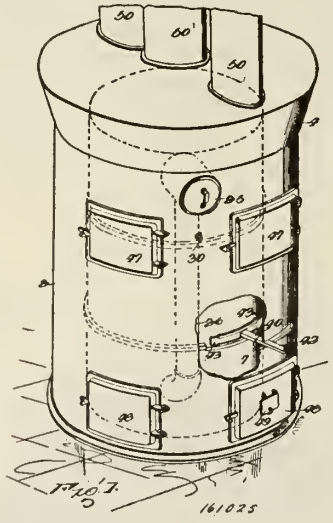
When h equals 144 feet then $V = \sqrt{(2g \times 144)}$, which nearly equals 96 ft. per second as given in Fig. 19 for the velocity of the water flowing out when the stand pipe is tapped 144 feet below the surface of the water.

(Continued in next issue).

NEW CANADIAN PATENTS.

James M. Blashfield, Jackson, Michigan, U.S.A., 2nd March, 1915; 6 years. Filed 14th April, 1914. Receipt No. 237,234.

Claim.—1. In a heating furnace, comprising an annular firepot and a surrounding air chamber, two fuel charging chutes extending across the air chamber at the same level and having an outwardly diverged arrangement and opening through the outer wall of the furnace upon the same side to admit of supplying fuel to the furnace from the front



through either chute, the outer walls of the chutes being tangential to the curved wall of the firepot to admit of such curved wall deflecting the fuel.

2. In a heating furnace, comprising an annular firepot, a surrounding air chamber and a centrally disposed air flue, two fuel charging chutes extending across the air chamber at the same level and having an outwardly diverged arrangement and opening through the outer wall of the furnace upon the same side, the outer walls of the chutes being tangential to the curved wall of the fire pot to admit of such curved wall directing the fuel to the rear of the central air flue.

3. In a heating furnace comprising an annular firepot and ashpit, separated by a fuel grate, an air chamber surrounding the firepot and ashpit, and a centrally disposed air flue extending through the ashpit and firepot, two fuel charging chutes arranged at the same level and extending across the air chamber at an opposite inclination and opening through the outer wall of the furnace on the same side, and two ash chutes in vertical line with the two fuel chutes and having an outward diverged arrangement, the outer walls of the two sets of chutes being tangential to the curved walls of the firepot and ashpit respectively.

4. In a heating furnace, an annular wall having an inturned flange at its lower end, an air flue supported at its lower end upon the inturned flange and extending vertically and formed with spaced outer shoulders, an annular grate supported at its inner edge upon one of the shoulders and held upon such shoulder by the shoulder next above, a rest upon the wall supporting the grate at its outer edge and means spanning the space formed between the air flue and outer wall and secured thereto and in contact with the grate to hold the same against vertical movement.

5. In a heating furnace, an outer annular wall having an inner flange at its lower end, a vertical air flue supported upon the inner flange, an annular grate arranged between the flue and the outer wall and supported thereby a septum extending across the space between the flue and outer wall near the upper ends thereof, an annular cap closing the said space and closely fitted to the upper ends of the flue and outer wall, said cap being arched between its inner and outer edges, and a deflector supported on the cap and spaced therefrom and extending over the air flue.

1. Representatives of the manufacturers and supply men at the picnic on the Island recently, lost the game but won esteem. 2. Sanitary engineers won the game as well as esteem. 3. Representatives of the Consumers' Gas Co., Toronto, who are doing their level best to increase the profits of the sanitary engineers all over Canada.

Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WATER IN BOILER DOES NOT HEAT

Editor Sanitary Engineer: Enclosed please find sketch of domestic hot water supply. You will note that the boiler is situated in the basement below the water front in the kitchen range, and is also connected with a coil in the furnace.

With a coal fire burning continuously in the range for 4 or 5 hours, only a small portion of the water at the top of the boiler is heated. Can you explain this?

I would also like to know whether the body of water in a boiler is heated more quickly by connecting flow pipe from water-front into top of boiler or by connecting flow to side of boiler?

Your valued opinion on these questions in your next issue of The Sanitary Engineer will be much appreciated.

SUBSCRIBER.

St. Boniface, Man.

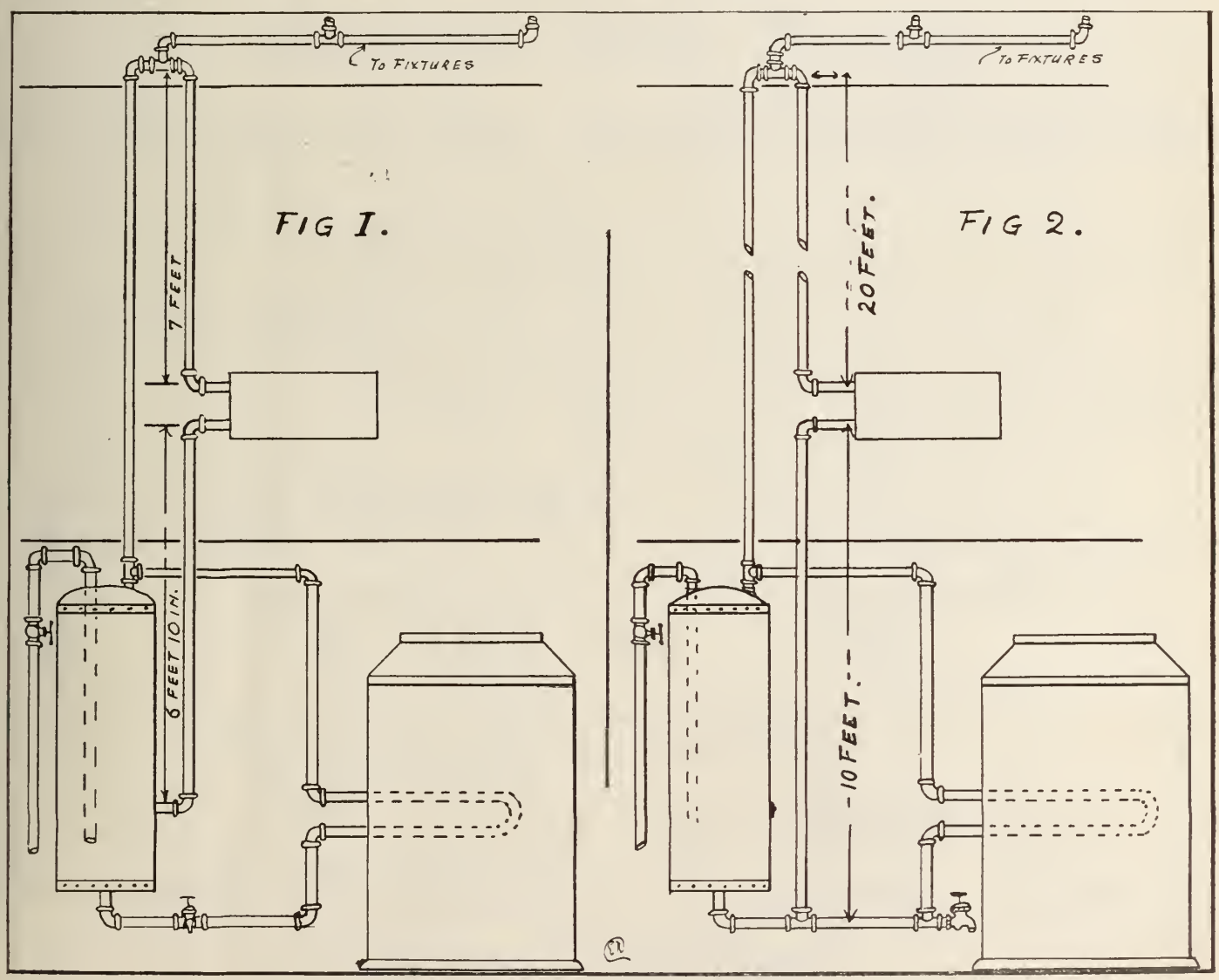


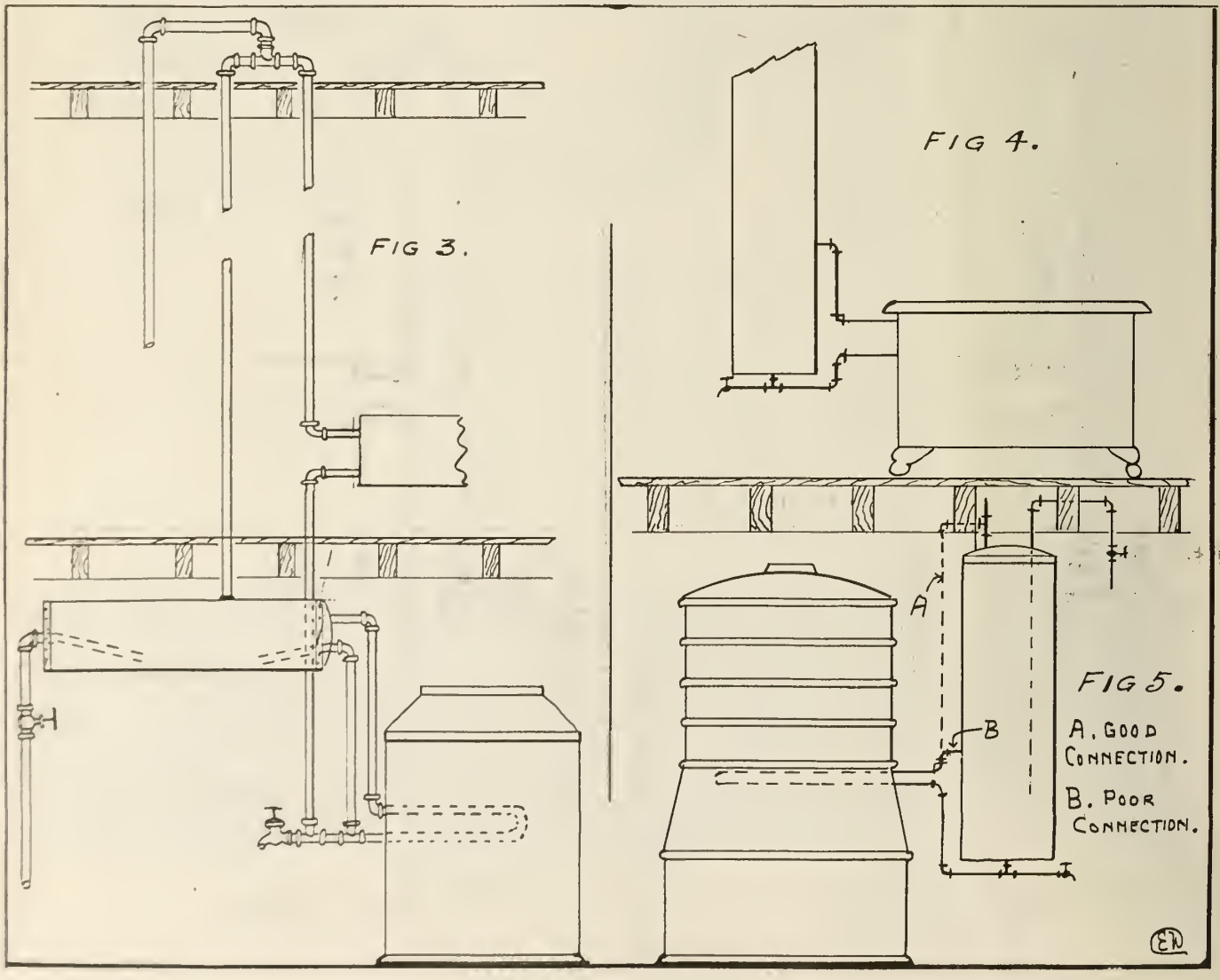
Fig. 1 is Subscriber's sketch. It will be seen that only one connection, viz., that of the coil in the furnace, can possibly give good results. In all hot water heating, whether for heating a building or domestic hot water supply, there is one principle involved. That is, the principle which makes for a free and uninterrupted circulation. The whole must have a good circulation, not one part alone. No doubt, though, "Subscriber" does not say so, there will be lots of hot water when the furnace is going. Why? Simply because there is free circulation, but with the range water-front connection such is not the case. When a case arises where the range boiler is situated in the basement and is to be heated by the water-front in a range above, as shown in Fig. 1, some other means must be adopted than are here seen. Fig. 1 shows a loop installed upward which is all right so far as it goes, but it scarcely goes far enough. Then again, the range boiler must be in direct circulation, which is not the case in the sketch.

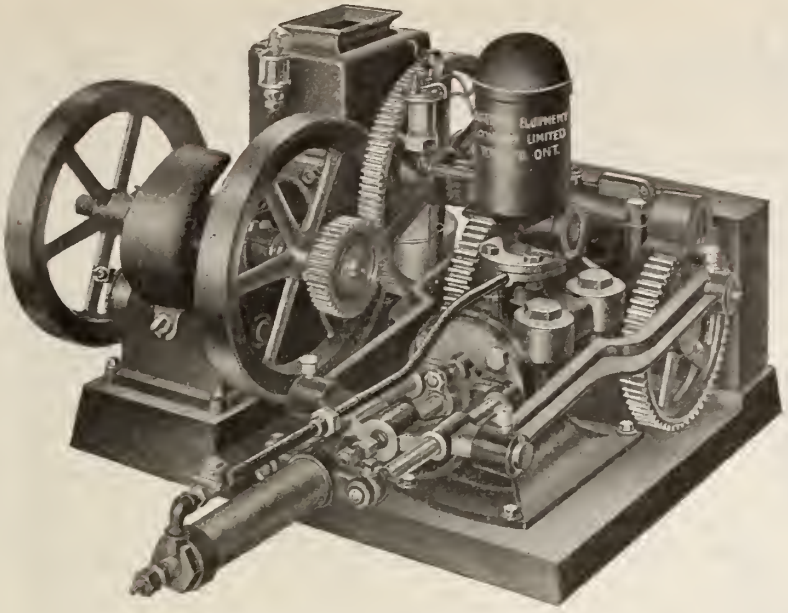
A very good rule to bear in mind when such a connection is wanted is this: If the lower outlet on the water-front and the bottom pipe at the range boiler (see Fig. 2), is 10 feet, then the distance between the top outlet of the water-front and the top of the loop should not be less than 20 feet, and the more it is the better, up to 30 feet. Such a connection is one which has to have circulation set up by the height of the loop, and all such circulating loops must have the whole body of water in direct circulation. In "Subscriber's" case it may be a hardship to run a pipe to too great a height. The side outlet on a range boiler is 18 inches from the bottom, and allowing 3 inches below that to the bottom connection, would make the bottom pipe from the lower water-front outlet about 8 ft. 7 inches. This being the case, the upper loop, instead of being 7 feet, would have to be approximately 18 feet, and connected as shown in Fig. 2. This, no doubt, would be all that is required. If, however, the water front is tapped one inch, it would be advisable to use 1 inch nipples and 1 x ¾ in. elbows.

If "Subscriber" finds it impossible for some reason or other to run a pipe loop to the height mentioned, 18 feet, then we would suggest that the boiler be slung into a horizontal position (see Fig. 3) as shown. Such a layout, it will be seen, will shorten the lower pipe, thus not requiring as tall a loop.

Regarding the last question as to whether it is better to connect a range water-front to the side or to the top of range boiler, it just depends where the boiler is located and whether the whole body of water is required or only a small quantity is needed quickly. If the range boiler is situated in the basement, Fig. 4 is the proper method to adopt. If range or coil is below the range boiler, as shown in Fig. 5, the side outlet is the best, and will give a larger quantity of warm water. If the range and boiler are on the same floor, the side outlet is the best place to insert the top tapping of the water-front, providing again that the top pipe is not shorter than the drop to the bottom of the boiler. This it may be well to explain. Note Fig. 5, which is an ordinary range boiler connection. The regular range boiler stand is 18 inches high, the tapping on the side of range boiler is 18 inches, the top tapping of an ordinary range water front is 24 inches; the dis-

(Continued on page 34.)





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147 University Ave., Toronto, Canada

WATER IN BOILER DOES NOT HEAT.

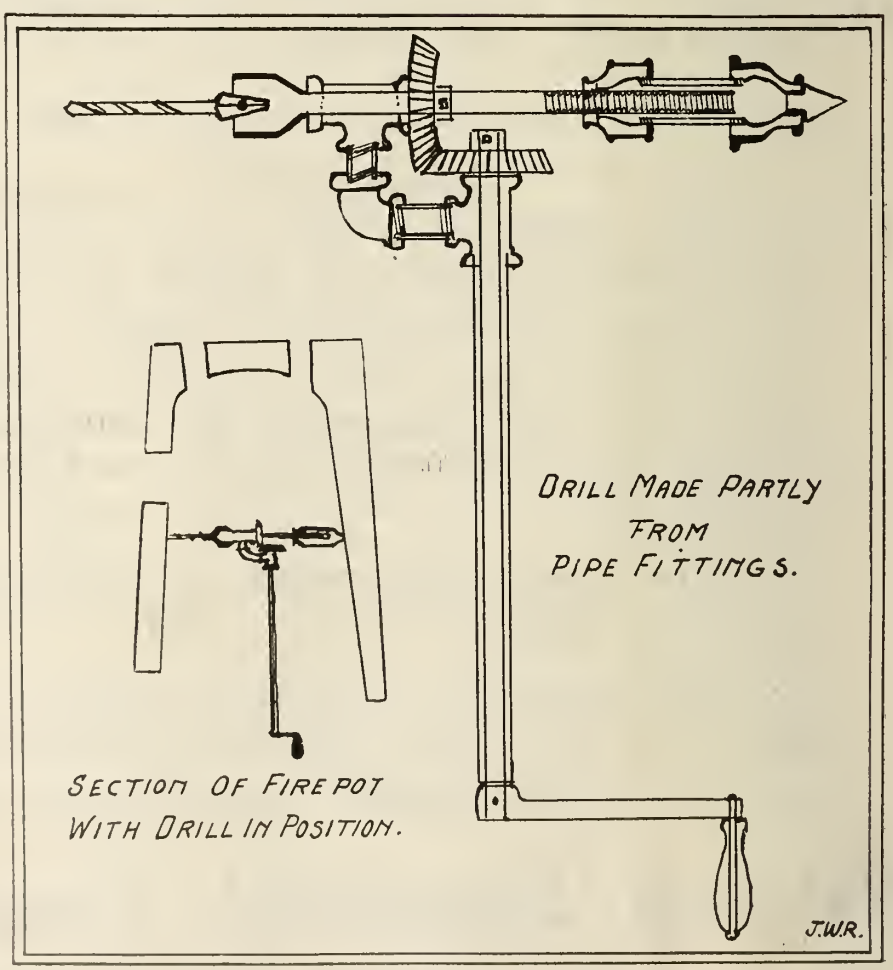
(Continued from page 32.)

tance between the two tappings is generally about 4 inches centre to centre. Now, such being the case, the tap water-front tapping will be 12 inches centre to centre with the side tapping on boiler, or thereabouts. The bottom outlet on the boiler can be run 2 inches below side of boiler and run up to the lower outlet at the water-front. This makes the side outlet on boiler and bottom pipe 20 in. centre to centre, taking four inches off, which is the distance centre to centre of water-front tappings. This makes the length of the lower pipe about 4 inches centre to centre. Now, if our readers will note, they will see that the same principle of free circulation is involved just the same as if the range boiler was in the basement and water-front about. The top pipes in Fig. 5 are just about twice the length upwards that the lower pipes are downwards. If, however, the range boiler be connected to a heater or coil in the furnace, the chances are that the side tappings on the boiler would be too low, therefore it would be necessary to run the top pipe to a tee at the top of the boiler. The same argument would apply if by chance the range boiler had for some reason or other to be set low down, thus bringing the side outlet too low and making the condition similar to a case where the lower pipe would be the longest.—Editor.

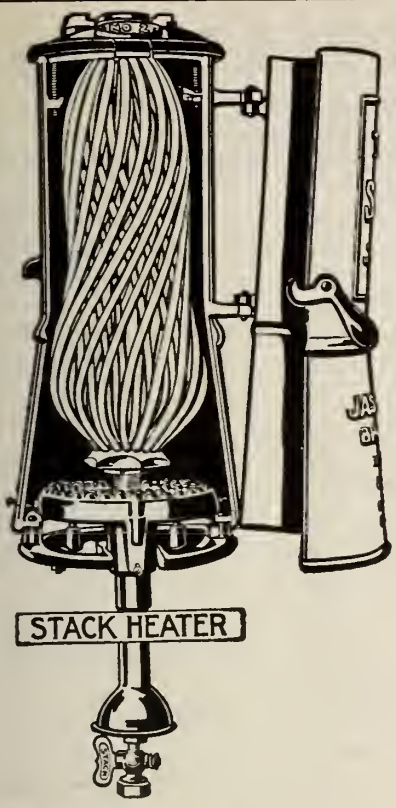
HOW TO REPAIR A CRACK IN TANK HEATER.

An easy way to repair a cast iron tank heater. We are much troubled in this part of the world with lime deposits in tank heaters and water fronts from the excessive hardness of the water. In the case in question the openings in a large tank heater became plugged causing a crack about three inches on the inside of the fire pot. The casting was worth about forty dollars and this was all that was wrong with it, so it was up to me to fix it if possible and this is how I did it. At the extreme end of the crack I drilled a 9/32 inch hole and tapped it 5/16 inch, into this I screwed a brass plug, and cut off nearly flush to the iron. To the side of this I drilled a second hole on the line of the crack the same size as the first and cutting into my first plug about a 1/32 inch all the way through, this I also plugged. I continued this until I had filled the crack with brass plugs each one intersecting the previous one and then riveted them all down flush to the iron. After cleaning out the lime I tested the job at fifty pounds water pressure, and it never leaked a drop. The crack was two feet from the opening in the casting and the fire pot was only twelve inches in diameter so I had to make a special drill to do the work. I enclose you a sketch of it, by which you will see that it was made principally from pipe fittings.

J. W. R.,
Portage La Prairie, Man.



Drill used in drilling fire pot of tank heater.



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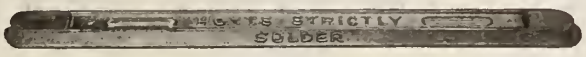

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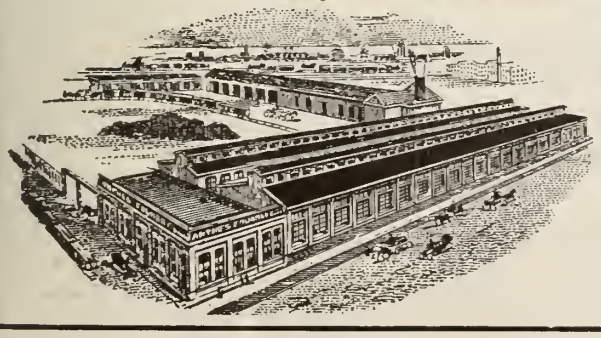

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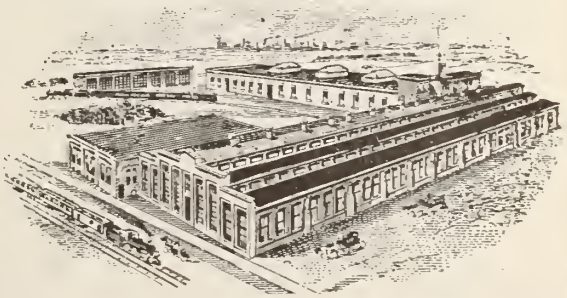

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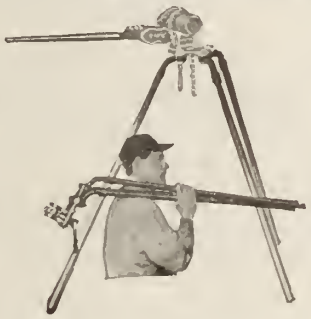

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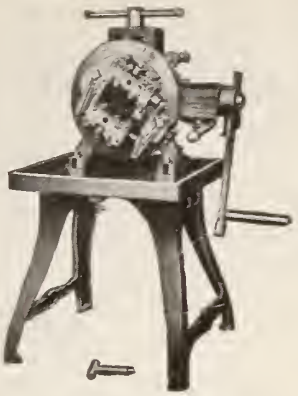

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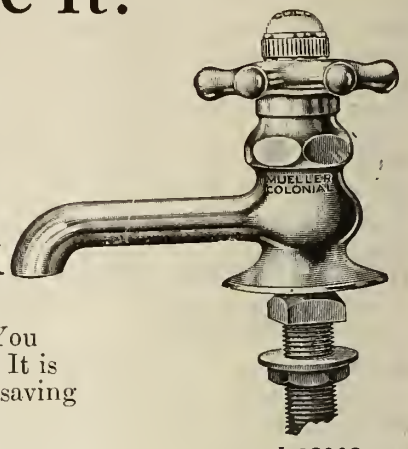

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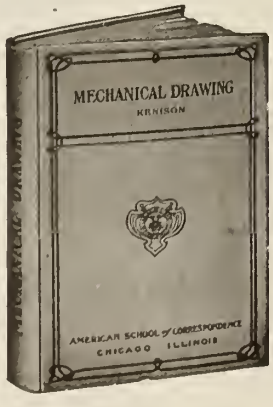

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Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.
Penberthy Injector Co., Ltd., Windsor, Ont.

Ejectors for Sewage.
National Equipment Co., Ltd., Toronto.

Enamelware.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Electric Pumping Machinery.
Ashdown Hardware Co., Ltd., Winnipeg.
Empire Brass Mfg. Co., London.
General Machinery Co., Ltd., Toronto.
National Equipment Co., Ltd., Toronto.
Jno. Stevens & Co., Ltd., Winnipeg.

Fittings.
Empire Brass Mfg. Co., London.
International Malleable Iron Co., Guelph.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., London.
Galt Brass Co., Ltd., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Floor and Ceiling Plates.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.
Canadian Wolverine Co., Ltd., Chatham.
Gurney Foundry Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Garbage Burners.
Gurney Foundry Co., Ltd., Toronto.

Gasoline Engines.
National Equipment Co., Ltd., Toronto.

Gas Water Heaters.
Gurney Foundry Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Gas Generators.
P. Campbell & Co., St. John, N.B.

Generators.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Gurney Foundry Co., Ltd., Toronto.
Harris Construction Co., Ltd., Montreal.
E. S. Manny Co., Montreal.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
Empire Brass Mfg. Co., London.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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P. Campbell & Co., St. John, N.B.

Mixing Valves.
Geo. Carpenter, Montreal.
Standard Sanitary Mfg. Co., Toronto.

Nipples.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
Warden King, Ltd., Montreal.

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General Machinery Co., Toronto.
National Equipment Co., Ltd., Toronto.

Packing.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

Pipe Joint Compounds.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

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Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Cluff Bros., Church St., Toronto.
C. A. Dunham Co., Ltd., Toronto.
General Machinery Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
John Stevens & Co., Ltd., Winnipeg.

Radiators.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn.

Radiator Traps (Steam.)
C. A. Dunham Co., Ltd., Toronto.

Reducing Pressure Valves.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves.
Galt Brass Mfg. Co., Galt.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.

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Hoyt Metal Co., Toronto.

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Honeywell Heating Specialty Co., Montreal.
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Kerr Engine Co., Walkerville, Ont.
The E. S. Manny Co., Montreal.
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C. A. Dunham Co., Ltd., Toronto
Harris Construction Co., Ltd., Montreal.
E. S. Manny Co., Montreal.

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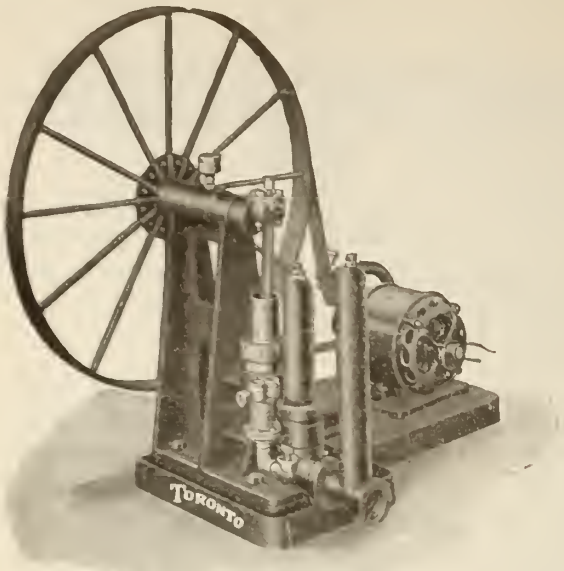

TYPE "S"—Capacity 150 gallons per hour.

For Pressure Systems

If you are interested in the installation of Hydro-Pneumatic or pressure systems of water supply you will want to know about the

TORONTO

Silent Electric
HOUSE PUMP

Noiseless, strong, economical of electric current, and singularly efficient in operation. It has so many improvements over other makes that it is considered without an equal to-day.

SEND FOR ILLUSTRATED FOLDER "S."

Our engineering department is at your service. Consult us about your problems and difficulties.

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Head Office: TORONTO
Branches: Montreal, Winnipeg, Calgary.

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"Digest of the Mercantile Laws of Canada"

PRICE $2.50

At the recent convention held in St. John, N.B., the question of the lien law was discussed.

Every Sanitary and Heating Engineer in Canada should know a little of the laws in force in his province.

This Book contains over 1,000 subjects of interest to every business man in Canada. Write to

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BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES

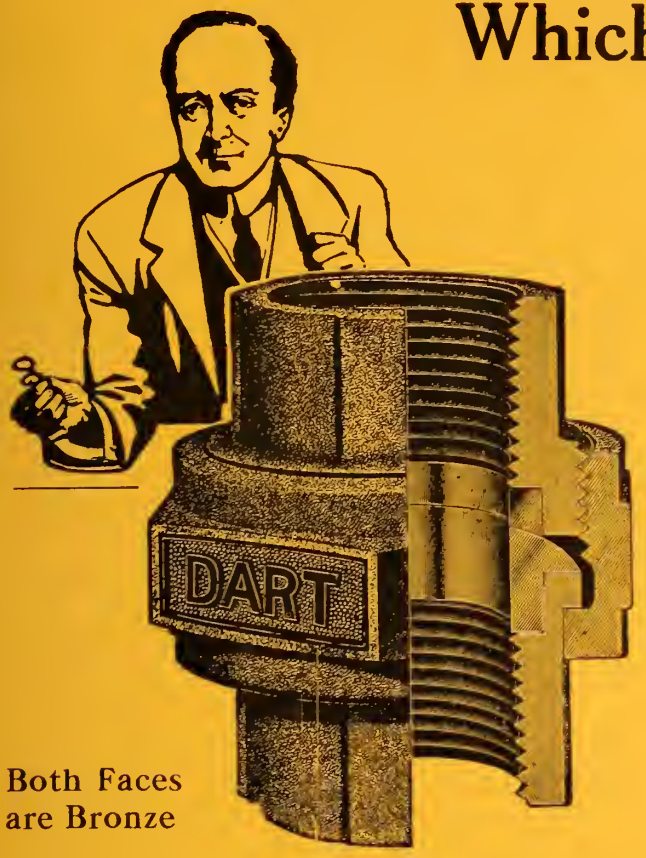
Black and Galvanized
All Sizes

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED

Montreal Works: Lachine Canal

Which Is The Cheaper?



Both Faces are Bronze

To use a pipe coupling that gives you a trifle more immediate profit and which causes trouble to your customers, several trips at your own expense to make things right, and very often a lost customer

OR

to use the **"Dart"—the permanently efficient pipe coupling**—the coupling that requires no attention whatever and never causes trouble or complaints.

Dart Unions are sold by jobbers from Coast to Coast.

Think It Over.

DART UNION CO., LIMITED
Toronto, Canada

KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

This plant is at your service.
Help us keep it busy.

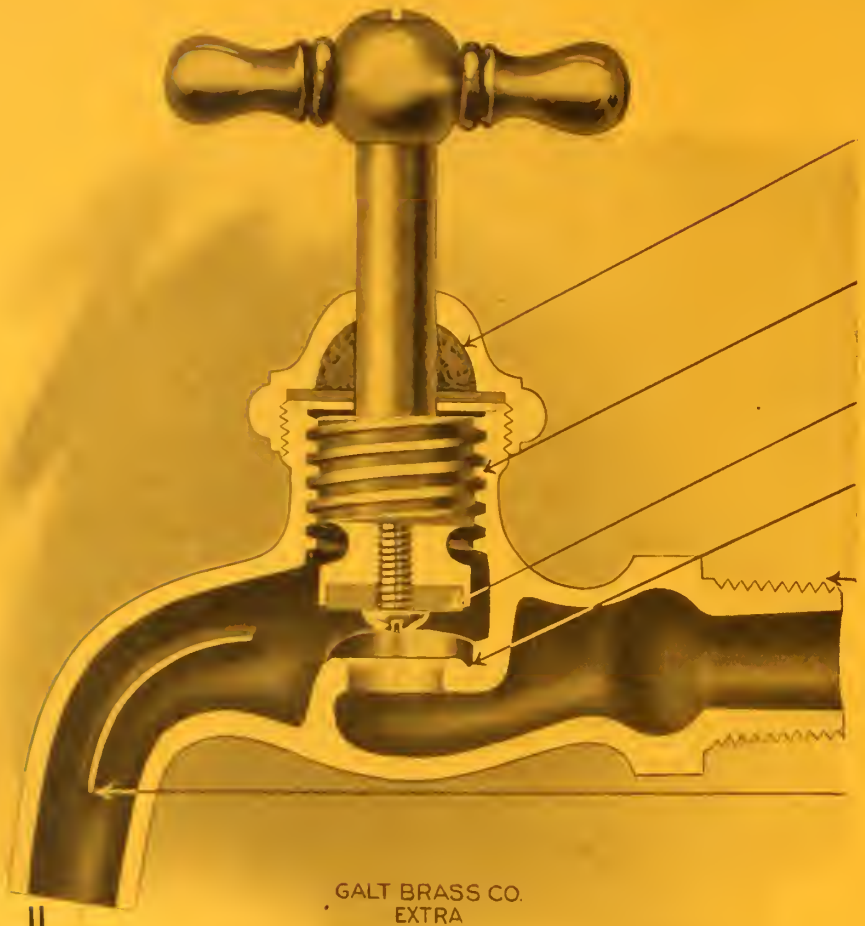
Quickest possible deliveries. Consistent Prices.

Best quality of goods.
Write for Catalog No. 5.

The Kerr Engine Company, Limited Walkerville, Ontario

Valves and Hydrants Exclusively

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER

PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX | Publication Office : TORONTO, AUGUST 16, 1915 | No. 16

AT YOUR SERVICE

Interior Views "Standard Ideal" Showrooms

Montreal *Toronto*

Hundreds of people daily visit our Showrooms—Trade and Public—Customers and Prospects—some to buy or select; others to secure certain information, or, simply to examine our products in anticipation of their later requirements.

Our Showrooms are at your service—all the facilities they afford are available any time—always, for your interests or the interests of your customers or prospects.

All of our showroom fixtures are priced in plain figures—and provide a liberal profit for the plumber.

The Standard Ideal Company Limited

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SUPERIORITY PURITY DURABLE AS THE PYRAMIDS

SUPERIORITY PURITY DURABLE AS THE PYRAMIDS

The Largest Exclusive Cast Iron Enameling Sanitary Works Under The British Flag.

Beaver Brand
Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.

The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

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General Offices and Factory: Amherst, Nova Scotia

AGENCIES:

ONTARIO:
Monarch Brass Mfg. Co.,
71 Brown St., Toronto

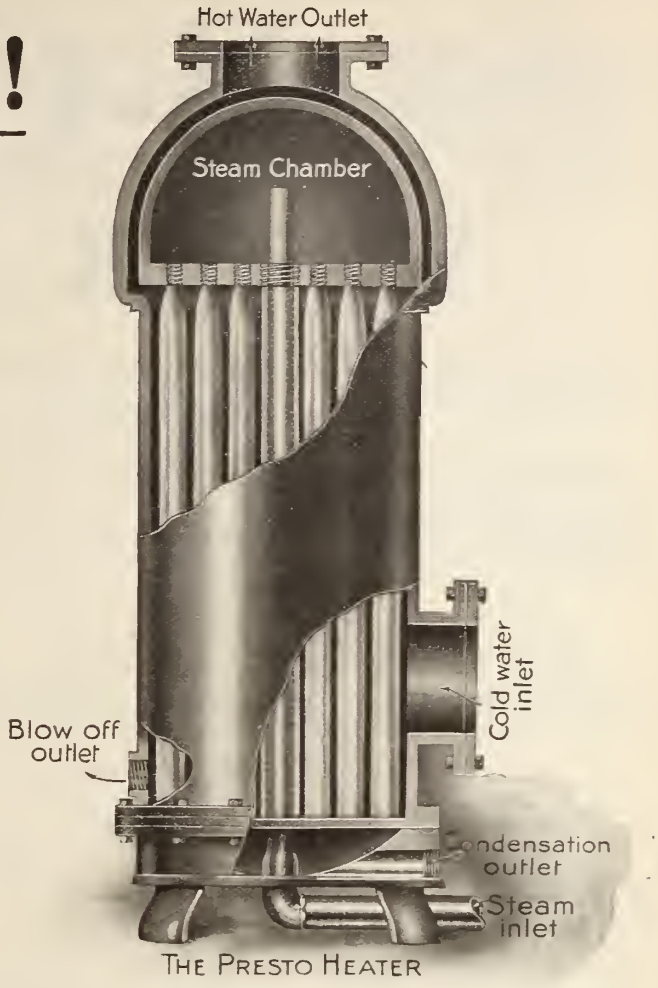
MANITOBA and NORTHWEST:
E. B. Plewes,
120 Lombard St., Winnipeg

BRITISH COLUMBIA:
A. O. Campbell,
864 Cambie St., Vancouver

ONLY A BLUFF!

We are sorry to announce that the test between the PRESTO and another heater will not be made.

Last month we received definite word from the manufacturers who accepted our challenge that their heater would be shipped in time to complete the test by August 15th. We were forced to stipulate that the test be completed by this date as the institution of the Good Shepherd in Quebec would not permit us to use the building later, as preparations would then be commenced for the reception of pupils.



THE PRESTO HEATER

We have not heard from the firm who accepted our challenge since July—

Their heater has not arrived and it is now impossible to make the test as agreed upon.

THEIR BLUFF WAS CALLED

They thought we were bluffing or they would never have accepted our challenge—we altered the conditions to suit them, so that they were forced to go ahead.

Rather than submit to the publicity of a test they dilly-dallied until it is now too late.

It is interesting to note that some time ago the Presto was tested with this other heater at the Kingston Penitentiary.

The Presto showed an economy of considerably more than 25% over the other heater.

We will give you full particulars if you will write.

Harris Construction Co., Limited

120 Sanguinet Street MONTREAL

B-O-T

LOOK FOR THE TRADE-MARK

WATER CLOSETS

WOODWORK: Guarantee against cracking and splitting. Tanks are lock-doweled; Seats spiral-doweled.

FITTINGS include B-O-T "FOOL-PROOF" LEVER and B-O-T BALLCOCK.

BOWLS: All kinds, as well as the B-O-T "Non-clogging" Bowl with the straight expanded leg.

The B-O-T Mfg. Company, Limited

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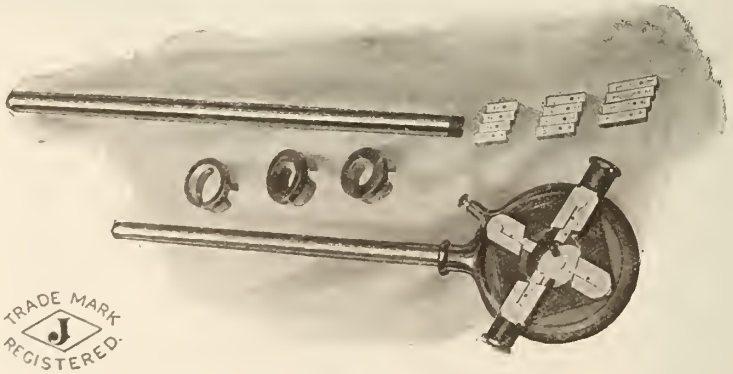
Montreal: Thos. Robertson & Co., Ltd.
Vancouver: The Robertson-Godson Co.
Edmonton: Carroll-Wilson Co., Ltd.
Winnipeg: J. H. Leonard, 405 Tribune Building

All Threads finished at one cut



One Man does the work of two

"Toledo" Adjustable Ratchet Threading Tool No. 1A.
Capacity 1" to 2" inclusive.
Ratchet allows threading to be easily done in ditches or positions close to walls or ceilings. A man can easily thread a two-inch pipe with this tool. Will thread a very short piece of pipe.

The Correct Cutting Principle of the Lathe Tool is Applied to the Cutters of

JARDINE & TOLEDO PIPE-THREADING TOOLS

As the tool advances on the pipe the cutters open out so as to make a proper taper on the thread. The cutting is all done by the mouth of cutter. The back threads don't cut, they don't rub on the thread, they merely steady the tool.

The threads are as clean and perfect as if cut in a lathe.
One man can thread 2" pipe in 1 minute.
" " " 4" " " 8 minutes.
" " " 6" " " 16 minutes.
" " " 8" " " 30 minutes.

Other superior features are, viz.:
Lead screw that ensures perfect pitch and form of thread.
Lightness and compactness of stock.
A set of cutters for each size of pipe.
Adjustable to all variations of fittings.
No cams or jimcracks to wear and get out of order.
Long life of cutters, low maintenance cost.
Drop a line for our pipe die catalog to-day.

MADE IN CANADA

A. B. Jardine & Co., Hespeler, Ontario

Sole makers of "Jardine" Pipe-Threading Tools. Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.

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The Daisy Boiler

The Most Popular in Canada

Easy to install.

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Economical to use.

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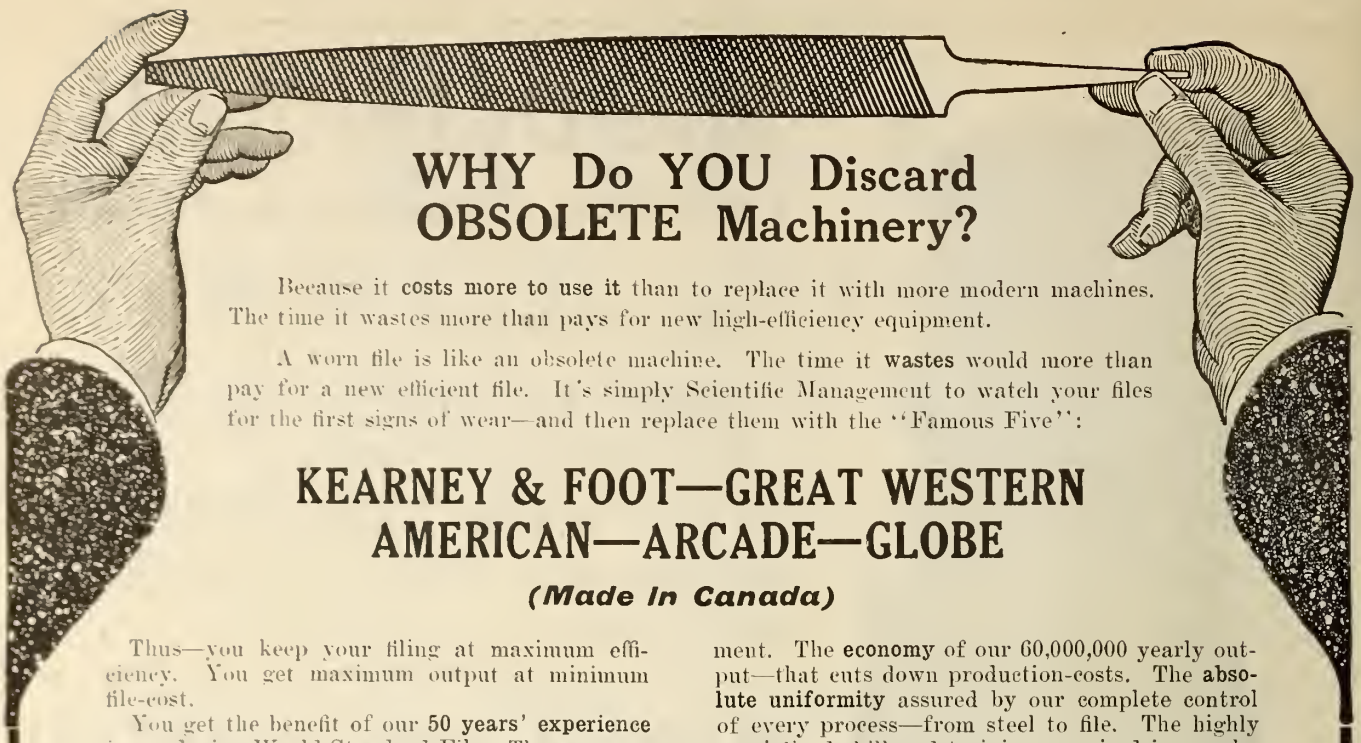


WHY Do YOU Discard OBSOLETE Machinery?

Because it **costs more to use it** than to replace it with more modern machines. The time it wastes more than pays for new high-efficiency equipment.

A worn file is like an obsolete machine. The time it **wastes** would more than pay for a new efficient file. It's simply Scientific Management to watch your files for the first signs of wear—and then replace them with the "Famous Five":

KEARNEY & FOOT—GREAT WESTERN
AMERICAN—ARCADE—GLOBE

(Made In Canada)

Thus—you keep your filing at maximum efficiency. You get maximum output at minimum file-cost.

You get the benefit of our **50 years' experience** in producing World-Standard Files. The **accuracy** of our **five** great plants, with their modern equipment. The **economy** of our 60,000,000 yearly output—that cuts down production-costs. The **absolute uniformity** assured by our complete control of every process—from steel to file. The highly specialized skill and training, acquired in supplying 90% of Canada's file-requirements.

** It costs no more to use the "Famous Five." And they DO cut down filing costs. Let "File Filosophy" and our Catalog tell HOW and WHY.*

NICHOLSON FILE COMPANY—PORT HOPE

(Dealers Everywhere)

Mr. "Licensed" Plumber

Bulletin No. 5

Some of your brethren in the trade have made special displays of water heaters—with very gratifying results, increasing their business and also their profits materially.

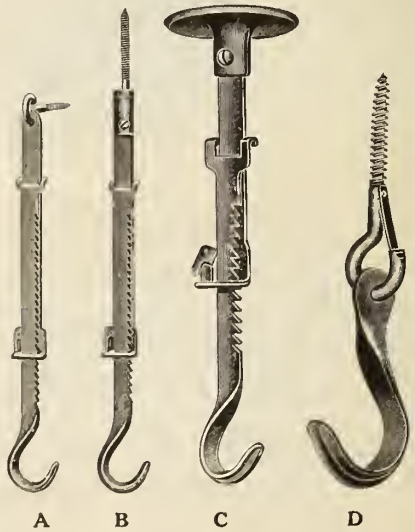
You will find that a Stack Heater installed in your show room—in conjunction with the Stack Distant Control System—will prove a source of profit. The cost of installation is small—but the resulting business is large.

We will help you to make a window display—or an installation in your show room. A phone message will bring our representative—prepared to point out the best possibilities of your window—and to give you the benefit of our wide experience in this direction.

The Consumers' Gas Company of Toronto

12-14 Adelaide St. West **Phone Adelaide 2180**

Malleable Iron Hook Hanger
Instantly Adjustable



to any pitch wanted. Simply throw back cam and adjust as desired.

Can be furnished with extension pieces up to 10 ft.

Write for Catalog and Prices.

The BEATON & CADWELL MANUFACTURING Co.

New Britain, Conn.

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FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

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SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

Royal Palaces in which "Standard Sanitary" Plumbing Fixtures were installed—a few notable examples of their world-wide popularity

"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

Standard Sanitary Mfg. Co.
Limited

General Offices and Factory: Royce and Lansdowne Aves., Toronto, Ontario

TORONTO STORE
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HAMILTON STORE
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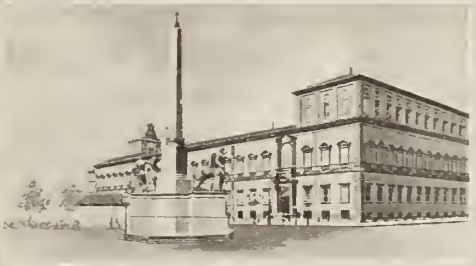
BALMORAL CASTLE
SCOTTISH RESIDENCE OF THE KING AND QUEEN OF ENGLAND



THE QUIRINAL
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ITALY ROME

BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS

A WIRELESS MESSAGE

About TUEC Service

(MADE IN CANADA)

IF YOU CAN SELL ONE TUEC

a month for one year you can buy and pay for a Ford with the profits.

THOUSANDS IN USE

It's up to you to see that every house in your territory is equipped with a TUEC stationary cleaner.

LET'S SHOW YOU HOW

THE UNITED ELECTRIC COMPANY

159 West Richmond St., Toronto, Ontario

Tuec received GRAND PRIZE at Panama-Pacific Exposition.

Jenkins Bros.' Brass Valves

represent a distinct type of valve in which the usual solid metal clapper is replaced by a brass or other suitable metal disc holder containing a renewable Jenkins Bros. Disc of a softer flexible composition which adapts itself to any slight inequalities of the seat.

No regrinding is necessary. When the disc is worn after long service it can easily be replaced by any one at slight expense, rendering the valve as tight as when new. The complete valves do not wear out.

Particular attention is called to the fact that these valves are fitted with **Manganese Bronze Spindles.** This metal is 60 to 70% stronger than regular bronze, is much harder and offers maximum resistance to wear.

A distinct feature is the metal gland or follower, as shown in stuffing-box, in sectional view. This gland compresses the moulded asbestos packing ring in the stuffing-box, making a perfectly tight joint.

Unless otherwise specified all Jenkins Bros.' Standard Pattern Globe, Angle and Cross Valves will be furnished with Jenkins Bros.' No. 119 Disc—the new composition for steam service.

Jenkins Bros.' Standard Pattern Brass Valves are made from ⅛" to 3" in size in globe, angle, cross, hose, Y, horizontal and swing check patterns.

Approved for use by the Depts. of Public Works in Ontario and the Western Provinces.

CATALOG MAILED—FREE.

JENKINS BROS., Limited

103 ST. REMI STREET MONTREAL

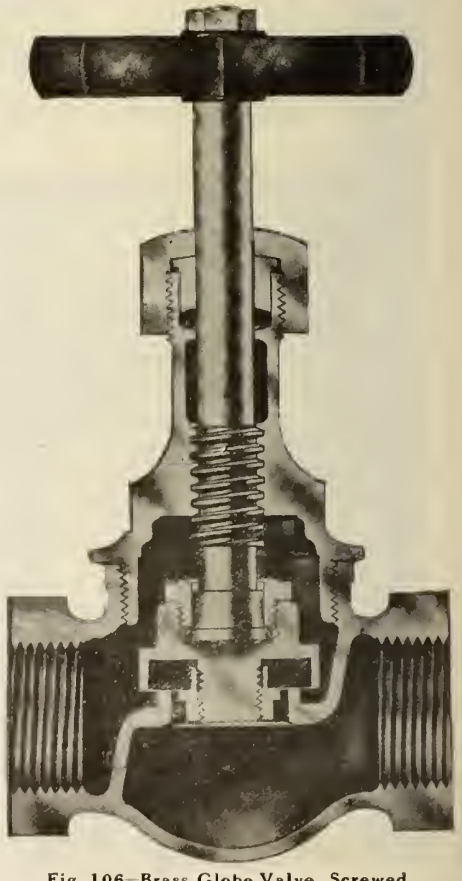


Fig. 106—Brass Globe Valve, Screwed (Sectional View)

Wolverine Tank Balls

—Guaranteed—

The ball with the reinforced top which makes elongation impossible.

Made of the finest rubber and will outwear three ordinary tank balls.

Our full line of Quality Rubber Goods are at your command, and if you want to give satisfaction all the time, use only Wolverine goods.

Canadian Wolverine Company

Limited

CHATHAM, ONT.

SOME FRANK STATEMENTS OF FACTS ABOUT

Honeywell Equipment for Hot Water Heating Plants

Honeywell equipment for hot water heating plants is used everywhere—regardless of weather conditions or climatic changes, entire satisfaction is assured.

All practical authorities on hot water heating admit the desirability of a slight pressure. It is obvious that pressure causes the water to circulate more rapidly.

The Honeywell Heat Generator is an absolutely safe and dependable mercury seal, which maintains just the right amount of pressure on a hot water system—safely—without danger.

HONEYWELL HEAT GENERATOR

Smaller and less piping is required for the Honeywell method than the ordinary system, reducing cost and labor of installing.

Thousands of Honeywell systems have been installed in Canada during the past ten years—its best endorsement.

Honeywell Heat Generators have greatly improved and cured thousands of old, unsatisfactory hot water heating plants.

Honeywell methods offer a choice of two ways of installing—the expansion tank can be placed either above or below the radiation, depending on the construction of the building or the wishes of the owner.

Let us make you more familiar with Honeywell methods and equipment—information of value to every heating man mailed upon request.

Honeywell Heating Specialty Co., Wabash, Indiana

SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, AUGUST 16, 1915 No. 16

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Technical Training—What Are You Doing?—Take a Holiday—Montreal Plumbing By-Laws.

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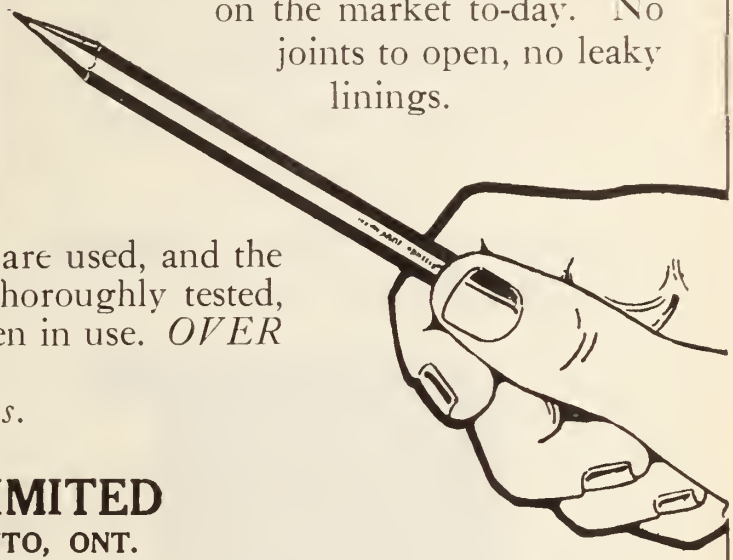

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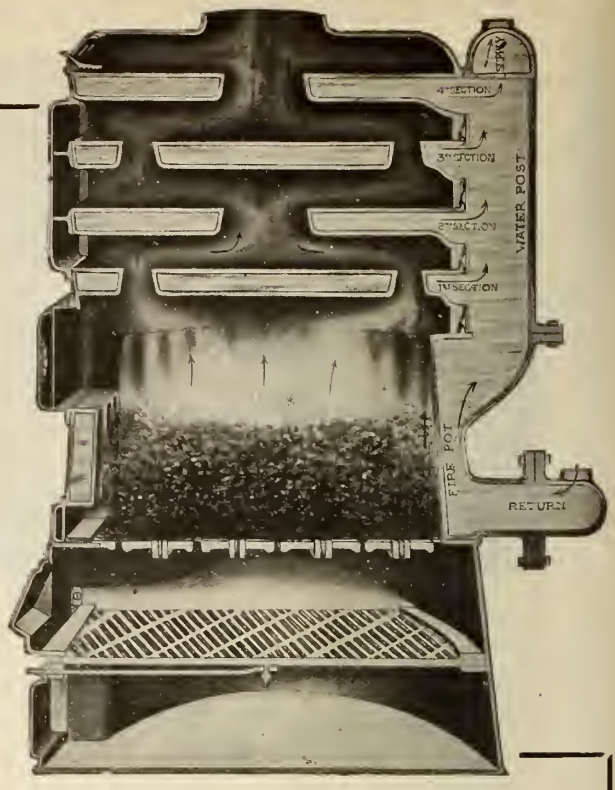

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THE SANITARY ENGINEER

VOL. IX. AUGUST 16, 1915 No. 16

Are You in the Fight, and How?

From Peaceable Production to War Material—Doing One's Duty in a Practical Manner—More Than One Way of Showing True Patriotism—Our Industries Can be Kept Busy If We All Join in the Fight—The Fight is On—Are You In It?

SEVERAL months ago The Sanitary Engineer made a statement that the calling of the sanitary and heating engineer was one of peace, one which did not cater to war or the building of war material, that the craft were engaged in catering to the health, welfare and well-being of humanity, that the work of the sanitary engineer and heating engineer was to prevent all kinds of illness which humanity is subjected to in places where unsanitary conditions abound.

To-day we are engaged in quite another line, more or less. Our manufacturers have "right about turned;" they are in the fight; they have reconstructed their plants at great cost. They are in the fight against oppression; they are assisting in a fight for freedom from all conditions which will prevent the weaker from enjoying that liberty which the strong can by force demand. These manufacturers are doing more; they are keeping their industries busy, and finding work for hundreds of thousands of men who would otherwise be on the list of unemployed.

It may be argued that there is money in the game for them. We do not doubt that for a moment; but, in whatever walk of life one is employed, money is to a great extent the reward of one's labors. There are those in this world who, while knowing full well that there is "money in it for themselves," yet never put forth any effort to get into the game. These manufacturers could very easily have sat back and declared that their plant was not such as would turn out munitions of war, and they would have been perfectly right in their assertions, but instead of that they began to study out ways and means as to how and what they could do. Not one of them can even surmise what the cost of reconstructing their plants will cost to enable them to turn to their regular lines of manufactures after the war is over. Lots of machinery which has been kept running at full load 24 hours a day for 7 days a week, will be about run out. But that viewpoint is not at this moment under consideration. These manufacturers are in the fight, they are doing everything in their power to bring this war to a successful issue. Now what are those of the craft doing who cannot join in the fight in the same way as these manufacturers? There is more than one way of joining in the fight. The duty of everyone is to do something of an extraordinary nature. Various methods can and should be adopted to keep the wheels of our industries moving. There are thousands of men out of work in Canada who can be kept working if we all do our duty in some way or other.

The building trade, as we are all aware, is at a standstill. The sanitary and heating trade is one which suffers very heavily in these times, but there is no reason why we should not build. Money is plentiful; bank returns prove this statement.

Money is the ammunition of commerce; with it all business is kept in an active state. Money when not in circulation is like powder and shot put away and hoarded up instead of being used on the firing line.

What would the man on the street think if the British nation gave orders for millions of shells and because they cost a lot of money were to hoard them up while the enemy made his advances?

Business stagnation is ahead. It is sapping the life out of our large towns and cities. It is causing property to depreciate which should not, simply because there is not sufficient energy being put forth to keep money in circulation. Buildings can be erected as low as 20 per cent. less than eighteen months ago. We are not on the whole adopting extraordinary means to keep money in circulation, or there would not now be over 700 million dollars deposited in our savings banks.

The heating engineer should know where every poorly heated house is located, and prevail upon its owner to instal an up-to-date heating system. Property which requires repairs can be kept up to current value if a little of that 700 million dollars is spent in keeping it in repair. Many a tenant is paying the same rent as before the war because the owner has put in new sanitary appliances, or a new furnace, etc.

There is no real reason why such instances should be exceptions rather than the rule. Just imagine what a benefit it would be to every trade if circulation of money were a little more active.

Active money would make things hum, just as shrapnel shells when fired make things lively for all with whom they come in contact.

But ammunition of any kind is worthless if not put into service, and all those plants which are now turning out shells are assisting in the fight for our country in just the way our country needs them. Then every man should be serving his country as best he can. Those who cannot make shell, those who cannot fight their country's enemy at the firing line, should be fighting with all their might against business depression, and thus keep Canada's commerce at high water mark.

NEW BOOKLETS.

A beautifully gotten up folder is being distributed to the trade by The National Equipment Co., Ltd., Wabash Ave., Toronto. It contains a number of the latest bulletins, which describe their Peerless water systems, and may be procured free by writing for same to address given above.

Value of Vacuum by Condensation

The Value of the Vacuum to the Engine—Heating Systems are Coming to the Fore Because of the Utilizing of a Vacuum—A Simple Experiment Can be Made to Demonstrate the Power of a Vacuum Set Up by Condensation.

EVERY steam engine rejects its exhaust steam at a pressure somewhat higher than exists in the vessel into which the exhaust is discharged. The condensing engine discharges into a condenser in which the pressure is, let us say, 2 lb. absolute. The cylinder pressure proves to be say, 3 lb. The same engine, without a condenser, discharges into an atmosphere at 14.7 lb. absolute pressure, and it may be assumed that its cylinder pressure will be 15.7 lb. absolute on the exhaust stroke. That is to say, the steam ports and passages give very much the same resistance whether there is a condenser or not; or in other words, whatever the vacuum secured, the mean cylinder pressure will benefit by that amount, for the excess or back pressure will remain very much the same. Thus, an engine will simply gain the advantage of its added "vacuum."

Let it be supposed that a given engine is doing its work at a mean pressure of 35 lb. non-condensing and that the addition of a condenser produces a "vacuum" of 12 lb. The engine will now possess a mean pressure of .7 lb. Let 1 lb. be taken off this for air pump driving and other losses, actual or assumed, and the mean pressure available for work will be 46 lb. instead of 35 lb. For the same steam that did work equal to 35 units, there are now being done 46 units. The unit of work is now done with an economy of 31.4 per cent. Usually, the condenser is not applied in order to do more work, but to save steam. With this in view the addition of a 12-lb. vacuum would enable the mean pressure to be reduced 12 lb. on the original non-condensing diagrams, or if 1 lb. is again allowed for air pump driving, by 11 lb. or to 24 lb. Then 24 + 12 = 36 lb., the new mean forward pressure. The original non-condensing diagram showed a mean pressure of 35 +, say, 2 lb. + 14.7, or 51.7 absolute. Then the mean absolute pressure when condensing will be 42.7 absolute.

Economy Example.

Now, the mean forward pressure of a steam diagram is

$$P \times \left(\frac{1 + \text{hyp. log. } r}{r}\right),$$

where P = initial pressure and r = ratio of expansion. In one case the quantity in the bracket is $\frac{51.7}{42.7}$ greater than in the other case, or as 1.21 : 1.00.

The quantity in the bracket may be worked out and tabulated for a large number of expansion ratios. For a cut-off at six-tenths, or an expansion of 1.66 = r, the quantity is 0.907. Assume this to be the case for the high-pressure working. Divide this number by 1.21. Then 0.907 ÷ 1.21 = 0.75, which represents the bracket quantity for a cut-off at about three-eighths, or r = 2.66 Then the steam consumption ratio is as three-eighths, to six-tenths, or as 5 to 8, and the steam economy is as 1.0 to 1.6, or 60 per cent.

This simple calculation shows the great economy that may often be secured by applying condensation methods, but it must not be expected that the actual economy will be so great, for it is well known that the losses which arise from cylinder cooling and heat interchange effects, all work to diminish the economy to be derived from earlier cut-off and greater ratios of expansion. If the best economy were sought it might be found partly in putting the cut-off earlier and partly in reducing the size of the cylinder, but this would depend much upon whether the earlier cut-off necessary was such as to give to R a value too high, whereby too much cylinder condensation would occur. The use of superheat would influence the question, for, by the aid of superheat, the cut-off in a steam engine may be economically possible at an earlier point than when there is no superheat.

Steam Engine Performance.

It is never possible to calculate steam engine performances with mathematical accuracy, and therefore it is useless in rough practical work to confuse the issue by fine-drawn mathematics. Every engine is a law to itself, and two engines cast off the same patterns by the same moulder may be very different performers, for their inner cylinder surfaces may possess quite different textures and qualities. It is however, simple to work out broad features and find what any change should do by way of economy.

In electrical work, where the load varies much, the average mean pressure taken over, say, an hour's run, is very low, and, the addition of a 12-lb. vacuum may mean a very large percentage of economy, for the addition of vacuum adds practically a rectangle the full length of the indicator diagram, which, above the atmospheric line, is a figure which curves rapidly down to near that line or even below it.—Power User.

EDITOR'S NOTE.

This article is reproduced with a view of showing our readers the value of the vacuum such as is set up in heating systems.

If condensing steam from the exhaust of an engine will raise the efficiency of that engine there can be no doubt of there being a saving in fuel to a greater extent in heating by a vacuum system. Of course all steam systems must first be cleared and kept cleared of air. The vacuum will not only keep a steam heating system clear of air, but also water of condensation, providing, of course, that all pipe lines are properly installed.

A very simple experiment may be made which will further prove the power of a vacuum. Take a pint milk bottle and hold the mouth over the spout of a steaming kettle, do not allow the bottle to become hot but simply filled with steam; suddenly submerge the mouth of the bottle into a vessel containing lukewarm water. It will be found that the condensing of the steam will create a vacuum which will draw the water nearly half way up the bottle, thus clearly and simply proving the value of a vacuum in steam heating.

LOCAL ORGANIZATION.

What are you doing to organize the trade in your town? It is up to everyone to do his part. Do not think the other fellow will do it all.

If our craft is to prosper and achieve those things which are most desired, we must be all ready and willing to lend a hand. If you wish any information regarding the best methods of accomplishing this, drop a line to G. F. Frankland, 1093 Bathurst street, Toronto, explaining how many competitors you have, and some idea of your local conditions.

How the Trade is Fighting the Enemy

From the Manufacture of Radiators and Boilers to Shrapnel Shell — An Industry Requiring a Lot of Insight and Concentration of Energy as Well as the Investment of Large Quantities of Capital.

Photos shown in this article are by the courtesy of Steel & Radiation, Ltd., Toronto.

IN the early stages of the war, it was realized that ordinary business could be carried on under formidable and increasing difficulties, the position of manufacturers catering for the trades represented by this journal was one of apparent dejection.

Large schemes of structural development were indefinitely postponed, and the building trade with its allied branches, on the point of recovery, were thrown back again almost to stagnation. Nowhere throughout the country are factories producing at their full capacity. Staffs are reduced, and workers are only partially employed.

These are the conditions in factories except in those cases where the manufacturers have heard the country's call, and have reconstructed their plants, and invested new capital in a very liberal manner.

A great deal of the new plant will be of very little use to its owners in their regular business, yet, in spite of that, manufacturers in a number of cases have forged ahead. The same is true of sanitary and heating engineers. Some have sat back, bemoaned their lot, and, like Micawber, in David Copperfield, are miserably content to wait for something to turn up. Then there are those sanitary and heating engineers, who, like the manufacturers, have heard their country's call, have mobilized their resources and have got into the fight, by looking up and creating new business. Steel and Radiation, Ltd., Toronto, whose specialties are the manufacturing of boilers and radiators, are one of the firms who are doing wonders in the manufacture of shrapnel shell.

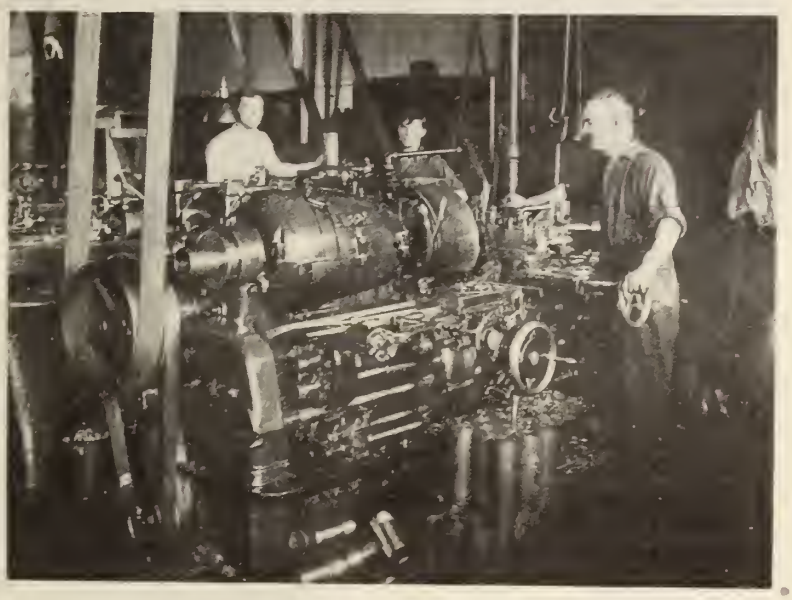
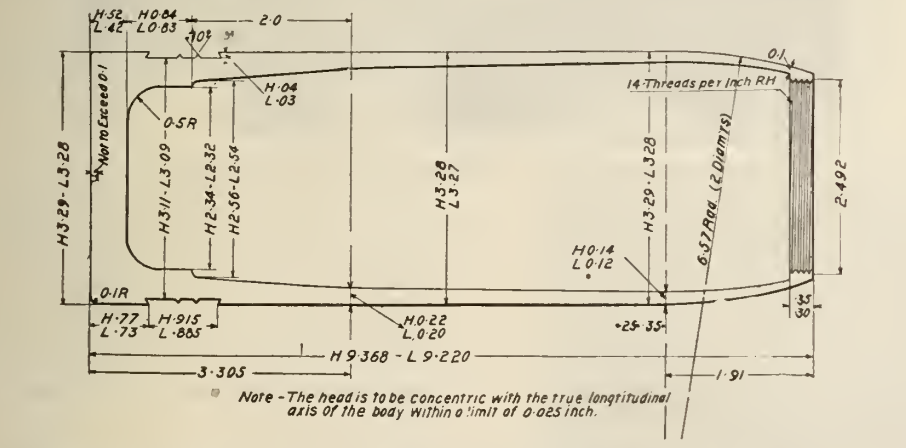
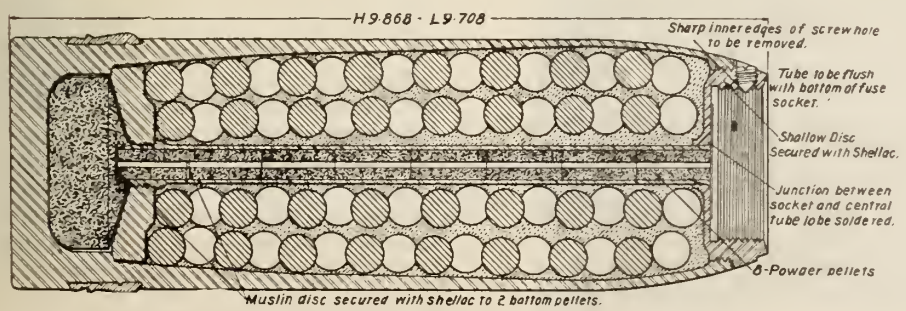


Fig. 1.—Turret lathe rough-turning body of shell.




H 9·868 - L 9·708
Sharp inner edges of screw hole to be removed.
Tube to be flush with bottom of fuse Socket.
Shallow Disc Secured with Shellac.
Junction between socket and central tube to be soldered.
8-Powder pellets
Muslin disc secured with shellac to 2 bottom pellets.

Sectional views of British 18-pound shrapnel shell.

They saw clearly that the Lord helps those who help themselves. They heard their country's cry for shells, shells, more shells, and responded in a noble and creditable manner. To R. J. Cluff, the general manager should be given the lion's share of the credit. He called his mechanical staff together, inoculated them with the enthusiasms with which he himself is so highly charged, and together they "went to it." This company re-organized their plants and are at this present moment turning out a very creditable quantity of shrapnel shell as well as supplying all demands for their regular line of boilers and radiators.

A shell is not the simplest of manufactured products, a number of differently skilled hands, in different work places, go to the making of the finished projectile. The setting up of new plant, the adaptation of existing plant, the organization of skilled labor, hitherto employed otherwise is a gigantic task. The task is now well in hand, and it is sur-

Fig. 2.—Section of furnaces where shells are tempered.

prising that Canada has done so well in so short a time.

There are several causes for the backwardness of the iron and steel industries, but there were two which in importance outweigh all others, namely, the inability of the steel and iron works to enlarge and run regularly at the full capacity for economical production, owing to a limited demand, and the lack of high-class machinery plants capable of dealing with a large output of manufactured iron and steel.

High explosive and shrapnel shell manufacture has called for a large production of steel and the provision of capital adequate for the necessary new machinery, which will permanently alter the basis and character of this industry, and enable Canada to rank as a successful competitor in the vast work of rebuilding Europe.

We can only sketch in broadest outline, the extensive plant and equipment in the above works necessary to convert the rough billet and forging into the highly finished shell which has won the approval of the military experts, as being equal to the English, and superior to the American projectile. All the machines are new and up to date and can be readily adapted into any scheme of general work.

The shell forgings are received in carload lots from the forging plants, the various shipments having had heat numbers assigned to them there. These heat numbers are useful in determining the heat treatment at a later stage of manufacture. Thus, the shells in one series are all kept together. The word "series" is here used with regard to a number of shells which bear the same heat number. Later the word "series" will be used in another connection.

Sometimes all of a carload of forgings have the same heat number, and then again, among the carload, several numbers may be found. The shell forgings of one heat number all have the same percentage of carbon, hence the importance of keeping a series intact.

Fig. 3.—Testing shell for hardness with a Scleroscope.

Fig. 4.—Nosing press.

The shrapnel shell is first seen as a rough forging, and after being cut the desired length and faced, is placed in a massive turret lathe (Fig. 1) where the shell is rough turned.

On every shell a recess is formed to take the copper band. This band is necessary so as to grip into the rifling of the gun. Two very sharp ribs almost like two threads on a pipe are cut in the recess. They are, however, not straight, but are waved. These are required to grip the copper band in the inside so that there is no chance for the copper ring to turn in the recess when being fired from the gun. The machines which do this work are remarkable for their speed and accuracy, a skillful operator turning out up-

wards of one hundred shells per 10-hour day. After passing careful inspection, these shells are passed for the boring operation. The tool is fed into the shell, and cleans up the bottom, forming the powder cup recess, and the shoulder for the diaphragm. After gauging, it is passed on to the annealing and hardening department. The furnaces are of the latest gas type, the shell being placed in the oven-furnace (Fig. 2) for a given time and heated to a given point when they are removed and dumped into the oil tanks near at hand. After which they are cleaned and passed to the annealing furnace. So successful has been the result that the shells are free from distrition and scaling.

Not the least important of the many operations which have to be performed in order to produce high quality shrapnel shells is that of "testing for hardness." A narrow strip round the body of the shell near the band groove is first polished, after which the shell is taken to the scleroscope. This apparatus consists of a vertical glass tube with an arrangement at the top for drawing up the steel hammer in the tube and a catch for holding the hammer until released. This part of the apparatus is operated by a rubber air bulb. At the back of the tube is a scale on which are figures which bear relation to the hardness of specific metals.

The shell is placed in a grooved block under the scleroscope and the diamond pointed steel hammer allowed to drop on the polished part of shell. The hammer rebounds and the figure at which it stops is noted by the operator. This is repeated several times, the shell being moved round each time. The hardness required of shrapnel shells must be around 45, a slight variation above or below being allowable.

The shell must not rupture at the point tested when its contained charge is exploded nor when the charge in the case is set off. Should the shell upset near the rifling band groove when being propelled out of the gun, it would of course destroy the rifling of the latter.

Fig. 5.—Tapping and nosing the shell.

Fig. 6.—Tapping and profiling shell.

Experience with the scleroscope has disclosed the existence of a definite relation between the hardness and strength of metal. In determining the strength of metal, two stages are recognized: First, the elastic limit, yield point or load required to start a permanent set; second, the ultimate strength or load required to terminate permanent elongation and reduction of area in rupture.

The hardness indicated by the scleroscope is intimately related to the elastic limit, as shown by the scale cut. The elastic limit increases more rapidly than the hardness from 43 to 45, this being the minimum index of the strength value required. As an elongation of 8 per

Fig. 7.—Turning the copper rifling band.

cent. in 2 inches is also called for, there must necessarily be an upper limit to the hardness. On the steel used for shrapnel which is generally about 50-point carbon, 70-point manganese, the maximum hardness should not be over 60 on the scleroscope.

Fig. 8.—Series of lathes turning brass sockets.

It will, therefore, be seen that the testing of each shell for hardness under the scleroscope, must be done with the greatest care, as the loss of a tensile test may mean the loss of a whole series of one hundred and twenty semi-finished shells.

As before stated, there may or may not be more than one heat number to a carload of forgings. Each heat number is, however, identified by means of its paint mark. Samples from each heat number are taken, and these are obtained from the ragged ends of the shell cut off in the first machining operation. The samples are examined, and, from experiments conducted, a heat treatment is established. This treatment is then applied to a sample bunch of three shells, and in most cases the shells respond to it. If, however, the shells do not respond, the whole lot of shells of that particular heat number is held up till a satisfactory heat treatment has been determined. When the samples come up to the required hardness the lot is put through. Should it become a difficult problem to get a certain batch of shells to respond to a heat treatment, analyses are sometimes taken, and the problem studied until satisfactory results have been obtained. After annealing, one shell in each lot is cleaned up and tested with the scleroscope.

When one shell passes the scleroscope test, the lot are taken to have passed. A number of shells are now placed on an iron table and the Government inspectors take two shells at random from the lot, being careful to always choose shells that have not undergone the scleroscope test. One of these shells is used for the tensile test and the other for the firing test. Here the shells lose their heat number identification and are made up into series of 120 each. Each series is given a number and this number is used to identify the series throughout the succeeding operations.

The nose is next treated for the nosing press (Fig. 4) but before closing in the nose the shell diaphragm is placed inside the shell. After closing the nose the shell is cooled slowly, and taken to another series of lathes for finishing the inside of the nose (Fig. 5). The end of the nose is faced, an accurate thread put in with a collapsing tap and the correct profile turned. The shells are next sent for finished turning and grinding (Fig. 6), additional plant having been added, in view of the increased production. They are now ground and turned to an exact diameter and again carefully inspected before being submitted to the first critical government inspection. The inspectors carefully caliper and gauge every part of the shell and if defective remove it from the series.

After this examination the shells are placed in a hydraulic banding press where the copper bands are pressed on and spread into the under-cut. This is one of the most important operations, as a defective band may mean the possible loss of men, or the gun being placed out of action for a lengthened time.

This band is next turned (Fig. 7) in the well built machines specially designed for doing the work with greatest accuracy. This accomplished, the shell is fitted with tin powder cup, the tube screwed into the diaphragm and then fitted. After which the brass socket is screwed firmly into the shell and on again to the set of brass socket turning lathes (Fig. 8) where the socket is brought to the correct form and size, and is ready for the final inspection. Everywhere, in its journey through the shop, the greatest care has been exercised in every process, yet the inspectors have to gauge on the shell for about a dozen dimensions, and if found true in every particular the shell is weighed and passed in its series to the government inspection room. Here again the shell is subjected to the closest possible scrutiny and passed out for painting (Fig. 9). They are then placed in strong boxes of sixes, and sent on their death dealing journey. It is impossible to convey in one short article the varied and intensely interesting processes going on all around as the shell takes shape.

The Lyddite Shells are usually of

Fig. 9.—Shells passing final inspection and painted after Government acceptance.

larger calibre than shrapnel, but here the weight is the same, and instead of the shell we get the solid forging which is drilled under one of the vertical press drills then turned and shaped. Unlike shrapnel, lyddite requires a long accurate thread inside the nose. Here too a thorough system of shop inspection is necessary to secure result commensurate with large outlay of capital (Fig. 10). The total equipment necessary for so great a number of machines and operations is one of the many astonishing surprises and the efficiency apparent in all directions shows that the management realizes the importance of this department.

Fig. 10.—*One corner of the tool-making department.*

Many of our readers may or may not be interested in this article, but our reason for publishing it is, that quite a number of persons have not the slightest idea of the important work some of our manufacturers are doing for our Mother country, and our own Dominion.

To our knowledge quite a large number have invested their capital, and are keeping their staff working in the production of these shells.

While we are not fully informed how many are assisting the government, we do know that almost all are, some to a much greater extent than others. The Steel & Radiation we believe are the leaders in this particular line, upwards of 400 men alone are finding employment in the making of shrapnel shell in one of their Toronto plants. The other two plants are taking core of their regular lines of boilers and radiators.

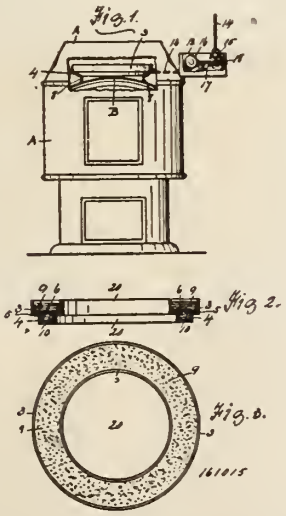
The worship of precedent is the death of business. If the old method is unsatisfactory or out of date, adopt a new one. If at first you don't succeed, try again.

New Canandian Patents

No. 161,015. Hot Air Furnace.

Frederick William Creech and Daniel Ernest McRae, co-inventors, both of Fort William, Ontario, Canada. 2nd March, 1915; 6 years. Filed 10th November, 1914. Receipt No. 244,884.

Claim.—1. In a hot air furnace, a humidifier consisting of a circular pan having an open top and an annular ledge midway therein, and supported above the heating dome of the furnace and in the casing thereof, a screen on the ledge, sand on said screen, and a water pipe adapted to convey water from an outside source to the pan, and mix with the sand therein.



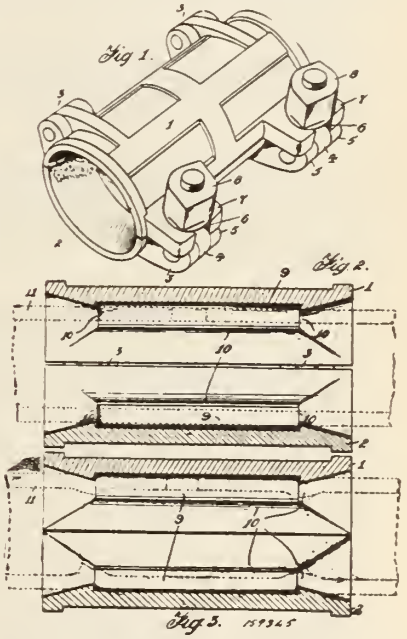
2. In a hot air furnace, a humidifier consisting of a circular water pan in the form of a ring and open at the top, a lower ring of lesser diameter integral therewith and opening into thereby forming annular ledges therein, a screen on said ledges, sand on the screen and water in said lower ring and in the sand, and a pipe connecting said pan with an outer water tank.

3. In a hot air furnace of the character described, a circular water pan open at the top, a midway ledge therein, screen on the ledge adapted to support a body of sand and water, and located above the dome of the furnace.

No. 157,284.—Bolt

The Canadian Expansion Bolt Company, Limited. Toronto, Ontario, Canada, assignee of Lothar R. Zifferer, New York City, New York, U.S.A., 11th August, 1914; 6 years. Filed 18th June, 1914. Receipt No. 240,247.

Claim.—1. An expansion bolt embodying in combination an expansible shield provided on its interior with two rectangular faces each inclined toward the centre thereof, walls adjacent said faces each having an inturned flange near the ends thereof, said flanges being related



to the inclined faces to constitute a substantially rectangular end opening into the shield, an expansible member arranged prior to expansion to lie partly without the shield of rectangular cross section as to its outer portion, and of different cross section as to its inner portion, whereby at the plane of juncture between said inner and outer portions a shoulder is provided adapted to rest against said inturned flanges to prevent displacement of the expanding member, and means for causing said expanding member to be advanced into the shield to bring about expansion, substantially as described.

THE SANITARY ENGINEER

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JOHN BAYNE MACLEAN - - *President*
J. G. LORRIMAN - - - *Manager*
EDWIN NEWSOME - - - *Editor*

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AUGUST 16, 1915

THE FIGHT is on, are you in it?

* * *

IF NOT, why not?

* * *

THE FACT is we're all in it, but are we doing our share? That's the point.

* * *

KAISER BILL doesn't care how, where, or when he causes destruction, so long as he's destroying something.

* * *

DON'T LET him be able to boast that he stopped the wheels of business in Canada.

* * *

GET INTO the fight against business stagnation just as heartily as the soldier boys have got into the firing line and instead of business stagnation, it will be "going some."

Technical Training.

AT this moment there are quite a number of parents confronted with the question "What shall I do for my boy?" What kind of training can I give him to help fit him for a life's work? Shall I send him to school for another term or shall I put him to some trade in a workshop or factory and let him work out his own salvation?

There never were such opportunities to give every boy a good industrial education as there are to-day. In large centres there is some kind of technical school, conducted either by a Y.M.C.A. or by the board of education. In small centres boys can take a good course in some of the correspondence schools which will prepare a course of special studies for the particular line which a person may decide to follow. One very vital point to consider in this matter is this: What are sanitary and heating engineers doing to encourage their own boys to enter the trade?

The writer knows of quite a number of sanitary engineers who are, as well as some who are not, encouraging their own sons to follow this calling. If the public are to be encouraged to furnish apprentices, there should be some example set by ourselves. See to it that we give our own sons the necessary technical training which will fit them to carry on this profession in an even more creditable manner than has been done in the past. Example is better than precept every time, and to see the sons of sanitary and heating engineers carrying on the good work is one of the highest recommendations the profession could have. Another very vital point to consider when engaging a boy as either helper or apprentice is this—no encouragement should be given a boy who will not devote a number of hours each week to study. If there be a good technical school in that town or city, the employer should demand that the boy attend this school and should encourage those boys who desire to study.

In small towns where there is no technical school, the boy should be given to understand that he must take up some course of study, and the employer should base the wages with that point in view, that is, wages so much, and allowance for cost of a course of instruction so much. In Toronto a splendid technical school will shortly be opened, and the Toronto Society of Sanitary and Heating Engineers are working out a scheme which will assist every apprentice to attend the technical school.

It is proposed to employ no boy who does not devote certain hours to study each week. These boys will be given two half days per week to attend the technical school and will be paid their time just as if they were on the job.

If this scheme works out as proposed, the rising generation of Canadian sanitary and heating engineers will look back at the year 1915 as a red letter year. Therefore The Sanitary Engineer desires to urge upon the present craftsmen the need of setting an example by giving their own sons the technical training necessary to fit them for the carrying on of this, the most creditable of professions.

What Are You Doing?

IN this issue there appear two articles which bear upon the present war which is being waged against Kaiserism. One of the articles describes how a certain company have put the plant into the fight by making shrapnel shell. The other describes war-time measures generally put into practice by the trade as a whole. The most vital need of all is to keep our wheels of industry going and to do this requires a great deal of initiative. Every person engaged in

the trade should be on the lookout for new business at every point.

Just to illustrate our point let us cite an instance which came to the writer's notice a week or two ago. A certain person called in a sanitary engineer and the boss himself responding to the call, arrived on the job with his kit of tools. The lawn tap had been broken off, and neither of the stop cocks would shut the water off. They were of the commonest type. The writer happened to be acquainted with the owner of the house and was being shown round. Noticing that the water pipe leading to the bathroom was sweating, he remarked that some tap or fixture must be leaking and was told that the WC tank was a constant source of trouble. The writer advised the owner to have the sanitary engineer look at the tank while he was on the job. The advice was followed out with the result that the tank was "to be fixed." Upon the writer taking a look later on at the tank, it was found to be a very old style tank and had been repaired time and again until the owner was almost sick of paying repair bills. The writer at once advised that a new, modern tank be installed and pointed out that the owner would thereby be money in pocket. This resulted in the repair job being cancelled and a new tank installed.

Here was a case, and we fear there are too many such cases, where the sanitary engineer should have been on the lookout for more work, work of a creditable nature, work which was not only more remunerative than a repair job, and a far better investment for the owner. Yet in spite of all this he did not rise to the occasion, and would no doubt have repaired the old tank, thus putting "new wine into old bottles."

There is altogether too much repair work being done these days which does not reflect very great credit upon the craft. Fixtures have been improved to such a great extent, that to spend too much time repairing an old fixture, very soon eats up the price of a new article.

The installation of a new sink which is not backvented and which, if the old one is removed, must be vented according to new plumbing ordinances accounts for more dirty, filthy sinks being in use than anything else, and while in most cases we believe a sink should be backvented when there are fixtures on a floor above, we certainly cannot see why a new sink which would, to say the least, improve matters, should not be permitted to be installed. If such were the case, there would be a big sale of sinks. Anything which will assist our manufacturers to keep their plants going, thus finding work for thousands of their men as well as our own journeymen, should receive the utmost consideration now-a-days.

No stone should be left unturned. Farmers should be called upon and shown what $1,000 will do on the farm if spent on the installation of modern sanitary and heating appliances.

Instead of allowing rents to drop down, owners should be shown how they can, by investing a little more money in new sanitary fixtures, or new heating systems, hold their tenants at present rents.

There are scores of instances where this argument has been applied, but it requires thousands of such jobs to keep us all on the move.

What are you doing to keep our factories going? Are our soldier boys to come back to closed doors? Will business be at a standstill or will it be in a flourishing state and in a condition to absorb and find work for all on their return? It's up to you, reader, to strain every nerve and do your bit in the fight in which we are all engaged.

Take a Holiday.

THIS is the holiday season. It is a time when business is not what it might be according to all accounts. Yet at the same time some of the members of the craft report "busy time." Be that as it may, the fact remains that everybody should, at some season of the year, take a holiday. We do not necessarily mean a costly journey, or a round of exciting events, but rather a quiet relaxation of the all-year-round grind.

Even a change of occupation bringing with it a new train of thoughts will often result in great benefits. Few owners of a horse would think of keeping it in harness every day in the week, the year round, that is if much value was placed on the horse.

Many are the instances when the horse is given a few weeks "out to grass," then why can't the owner of a business "go out to grass" for a period each year?

Many a time the owner of a business will state that he is too busy running his business and can't leave it for a holiday. That explanation is wrong. The fact is, the business is running him, instead of him running the business.

It is a clear case of the business owning the man, body and soul, not the man owning the business. Therefore we would urge every reader of the Sanitary Engineer to take a holiday while the weather is good. Give both body and soul a rest. Come back with renewed energy and make things hum.

Montreal Plumbing By-Laws.

IN this issue there appears the first of a series of articles which refers to the Montreal new plumbing by-law.

The Sanitary Engineer is commenting upon the by-law clause by clause, and will show from time to time how very necessary it is to have a number of practical men upon the town or city board of health.

If there has been one thing more than another which has actually retarded the progress of sanitary engineering, it is the lack of representatives of the craft upon our boards of health. Here is a by-law which is being foisted upon the citizens of Montreal in spite of the protests which no doubt the trade have made.

If, however, the craft had been consulted freely, fearlessly and fully, there would have been as fine a plumbing by-law as could be desired, for it is a well-known fact that Montreal can boast of having, not only the largest number of charter members of the National Association of Sanitary Engineers, but also a number of pioneer plumbers of Canada. Such being the case, they should, in all fairness to their qualifications have been entrusted with the re-construction of a new plumbing by-law for their own city. As the present by-law stands it is nothing more nor less than a joke, and one which does not reflect the least credit upon its compilers. We hope our readers will take note of these articles, which will appear in each issue until each separate clause has been commented upon.

Analysis of Canadian Plumbing Bylaws

Proposed New Plumbing By-law for Montreal—Many Clauses Not Only Ridiculous, But Impracticable, Proving That Sanitary Engineers Should be Consulted in Such Matters—The Sanitary Engineer Takes Full Responsibility for the Criticism Published in This Series of Articles.

SEVERAL years ago the need of a new building by-law was felt in Montreal, and in 1911 or 1912 a committee was appointed to draft a new by-law, consisting of representatives from the Canadian Society of Civil Engineers, the Province of Quebec Architects' Association, the Montreal Builders' Exchange, the Real Estate Dealers' Association, Montreal Master Plumbers' Association, the labor union, the city building inspector, the boiler inspector, the city sanitary engineer, and others. Alderman Clement, a builder, was the chairman. This committee was later found to be unwieldy, and the matter was finally referred to a sub-committee, consisting of Walter J. Francis, consulting engineer, and Joseph Venne, president of the Province of Quebec Architects' Association. These two men eventually submitted the final draft to the council, who have never yet considered the matter. Many far-reaching changes have been suggested in the by-law, some of which are so drastic that it is doubted in some quarters whether it will ever become law.

In the first place those who were responsible for the appointment of such an unwieldy committee showed poor judgment in their selection. What earthly use is there in placing such men as architects, civil engineers, builders or real estate men on such a committee? They have absolutely no knowledge of sanitary engineering construction. The city building inspector and boiler inspector, too, would both be out of place, and if those gentlemen had been in the least degree conscientious they would have refused to act upon such a committee. Then, the two latter men assumed a responsibility which no person would have done had they had a thorough knowledge of the subject, simply because the qualifications of a consulting engineer or an architect do not call for a practical knowledge of sanitary engineering construction.

If the city fathers of Montreal had chosen about five men at the start—men with qualifications such as would bear upon the matters involved—they would likely have appointed men holding such positions as those of:

1. The medical officer of health (chairman).
2. The city engineer.
3. The chief plumbing inspector.
4. A sanitary engineer of ten years' practical experience, and one who was a member of the Montreal Master Plumbers' Association.
5. A journeyman of not less than ten years' practical experience, and a member of the labor union.

Had such a committee been formed, there would have been a practical by-law in force at this present moment, instead of the conglomeration of meaningless words which now does duty.

We propose to reprint each clause in its regular order along with our criticism.

It may, however, be stated that this plumbing by-law is in reality a part of the building by-law of Montreal. This condition of affairs we do not agree with. **The Sanitary Engineer** believes that sanitary engineering construction is sufficiently important to claim a separate by-law complete in itself.

The first section or clause reads as follows:

GENERAL.

Section 582.—All plumbing, house drainage and ventilation shall be done in accordance with the following requirements:

There is no criticism to make on the above except that many of the "following requirements" could not be executed by anyone.

ILLUMINATION FOR WORKMEN.

Section 583.—It is forbidden for plumbers or workmen to use candles, oil lamps, or any method of illumination which may cause ignition of the building or its contents.

The above section is one which came into existence on account of there having been several fires in Montreal caused by careless plumbers using candles to detect leaks in gas pipes.

Instead of such a foolish section being put into force, it should have provided that any master plumber or journeyman found using a candle or any other naked light for the purpose of detecting a gas leak should have his license suspended for a period of not less than (6) six months. No practical man would ever dream of doing such a thing.

Portable electric lights can be had, which are filling a long-felt want, and every journeyman should have one in his kit of tools.

Section 583 could be more specific rather than so general. For instance, it debars the use of a gas light as illumination. A plumber or workman under this section would have to have electric light in every building he works in.

STANDARD CAST IRON PIPE.

Section 584.—Standard cast iron pipe shall have the following mimmum weights per lineal foot:

Internal diam. of pipe.	Per lineal foot.
2"	4 lbs.
3"	6 lbs.
4"	9 lbs.
5"	12 lbs.
6"	15 lbs.

No practical man would have worded a clause in the above manner simply because it does not define the purpose for which the pipe is to be used.

Sanitary engineers do not use cast iron pipe for any other purpose than for soil and waste; therefore, this section should say so. Further, there are at this date only two kinds of cast iron soil pipe recognized in the trade, and both are "standard."

These are known as "medium" or extra heavy, and bear the weight per five-foot length, as well as the marks "M" for medinm and "X-H" for extra heavy. Therefore, to use the words in section 584 really means very little to the practical mechanic engaged in sanitary engineering construction.

EXTRA HEAVY CAST IRON PIPE.

Section 585.—Extra heavy cast iron pipe shall have the following minimum weights per lineal foot:

Internal diam. of pipe.	Per lineal foot.
2"	5½ lbs.
3"	9½ lbs.
4"	13 lbs.
5"	17 lbs.
6"	20 lbs.
7"	27 lbs.
8"	33½ lbs.
10"	45 lbs.
12"	54 lbs.

APPLICATION OF TABLES.

Section 586.—The weights given in the tables for cast iron pipes shall be taken as the average weight of each five (5) foot length, inclusive of the bell and spigot.

The criticism made regarding section 584 applies also to sections 585 and 586, which call for no further comment.

WEIGHT OF STANDARD WROUGHT IRON.

Section 587.—Standard galvanized wrought iron pipe shall have the following minimum and average (weights) thickness per foot:

Nominal diam. of pipe.	Thickness.	Per lineal foot.
1½"	0.14	2.68 lbs.
2"	0.15	3.61 lbs.
2½"	0.20	5.74 lbs.
3"	0.21	7.54 lbs.
3½"	0.22	9.00 lbs.
4"	0.23	10.66 lbs.
4½"	0.24	12.34 lbs.
5"	0.25	14.50 lbs.
6"	0.28	18.76 lbs.
7"	0.30	23.27 lbs.
8"	0.32	28.18 lbs.

On reading the table accompanying section 587, it would appear that No. 1¼ inch galvanized wrought iron pipe would be allowed, seeing that such a size is not mentioned in any way. We thought it was well known that 1¼ inch is generally specified for vent or anti-syphon pipes on traps. It might, therefore, just as well have been included in this section. The weight of such a size is 2.24 lbs. per lineal foot.

LEAD PIPES.

Section 588.—Standard lead pipe shall have the following minimum weights per lineal foot:

Internal diam. of pipe.	Per lineal foot.
1¼"	2 lbs.
1½"	2½ lbs.
2"	2¾ lbs.
2½"	4 1-3 lbs.
3"	5¼ lbs.
4"	6 lbs.

Here is another instance where a section does not really mean anything to the practical sanitary engineer. It does not state whether the pipe may be used for waste pipe, water pipe or soil pipe, and simply uses the word "standard."

If it was intended that such pipe should be used for waste pipe, we would remark that it is not heavy enough, and is not what would be considered standard. A more practical clause would have read something after the following manner:

Lead pipe used for branch soil, waste, vent, or flush pipes shall be of the best quality drawn pipe, and shall not weigh less than the following specified weights per lineal yard:

Diameter of pipe.	Weight per lineal yd.
1¼ inches	7 lbs.
1½ "	9 "
2 "	12 "
3 "	18 "
4 "	24 "

LEAD WASTE PIPES.

Section 589.—Lead waste pipes shall have the following minimum weights per lineal foot:

Internal diam. of pipe.	Per lineal foot.
2"	10 lbs.
3"	14 lbs.

This section would infer that no lead waste pipe could be used other than 2 and 3-inch, and the weights given of these two sizes do not comply with the weight of lead waste pipe used in various parts of the Dominion. Neither do the weights correspond with weights given in table referred to in section 588. Such tables and definitions conflict with good practice, to say the least, and would not have been compiled if a practical committee had been formed at the first who knew their business.

FITTINGS.

Section 590.—The fittings used for each kind of pipe shall correspond therewith in weight and quality.

GALVANIZED IRON PIPES.

Section 591.—All wrought iron pipes and fittings shall be galvanized.

VITRIFIED PIPES.

Section 592.—Vitrified pipes shall be thoroughly burned and glazed, and they shall be incapable of absorbing more than three per cent. (3%) of their own weight of water.

The last two sections are superfluous by themselves, and should have been embodied in the sections dealing with the different kinds of pipe.

Section 592 is in order and of a very general nature, except that no such pipe should be allowed within the walls of any building, and thus would not come under the plumbing by-law at all.

(Continued in next issue.)

CARE OF THREADING DIES AND PIPE CUTTING TOOLS.

By P. W. Blair.

Owing to the universal use of dies for the cutting of screw threads on pipes and rods they should receive far more and better attention than is commonly accorded them.

The proper care of the dies and lubrication of same when in use is one of the greatest factors of economy that has to do with their use, and the cutting of screw threads has become one of the most important parts of nearly every line of manufacture of metal products.

In some cases the greatest limits of accuracy are required in the production of threaded parts and it is often remarked by users of stocks and dies, "How is it that I cannot cut so accurate and smooth threads as are on some of the fittings or bolts I have just purchased?"

The whole secret lies in the proper care they take of their tools and the lubricant used. As an illustration, a screw thread may be satisfactory if the parts merely have spiral marks which can be forced into a tapped hole and once in place it is out of sight and may never be discovered, consequently in some instances almost any kind of a thread will pass.

There are, of course, all sorts and conditions, but it seldom requires as much time to produce a perfect thread as it does the other kind, and the good thread can be produced with far less wear and tear on the tools.

If a man becomes sick he usually calls a physician and has his trouble diagnosed and suitable remedies applied. He rarely ever applies the same methods to his business. If a tool goes wrong and does not operate satisfactorily he does not spend much time trying to discover the cause of the trouble. If the trouble cannot be removed by the first application of his "remedies," the tool in many cases is condemned as being no good anyway, and he may also have something to say to the maker of such a tool.

In applying a lubricant for the cutting of pipe, bolt and other screw threads, similar results may be arrived at. Some users seem to think that any kind of lubricant can be used; consequently an oil of some kind is used, but seldom with proper regard, if any, as to whether the oil is suitable for the purpose. One of the most desirable features of screw cutting is to obtain the greatest quantity and quality of the work with the least wear and tear upon the dies.

It does not follow that because you have been using a poor grade of oil with fairly good results, that the same will be obtained when a new shipment of pipes or rods requires threading. The quality of the stock may vary to such an extent that a different grade of lubricant is almost necessary.

Many users of thread cutting dies may still maintain that a tool that will cut a good thread with one grade of oil should give satisfaction used with any oil. Not only should suitable lubricants be used for various grades of metals but also in the cutting of different metals.

Many large manufacturers carry quite a number of different oils and lubricants, and are still experimenting to obtain better results.

All stocks and dies when not in use should be kept in a suitable place and thoroughly cleaned of foreign substances, so that when they are again required they shall be in good condition.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 10.

Hydraulics.

IN the preceding article the law governing the flow of water from a stand pipe, due to a head of water, was stated. In general the statement can be made that the velocity of water flowing from an orifice or hole made in a tank or other receptacle depends on the head of water above the centre of the orifice, and theoretically this velocity is equal to the $\sqrt{2gh}$, where h is the head of water above the centre of the orifice and g is the velocity attained by a body after falling for one second in a vacuum. If h is measured in feet and an average value of 32.16 assigned to g, then the velocity determined by this formula will be in feet per second and equal to $8.02\sqrt{h}$ feet per second. (See Fig. 21.) As soon as the flow starts, this theoretical velocity is never found in practice. To keep the head of water in the tank at a constant level, the tank must be supplied with water, and this results in a flow of water in the tank itself, which tends to increase the velocity at the orifice. If, however, as usually happens, the cross sectional area of the tank is over ten times the area of the orifice this "velocity of approach" is so small as to be negligible.

In flowing out of the orifice there is friction between the water and the edge of the orifice. The result is to slightly decrease the theoretic velocity. Actual experiment readily demonstrates that the stream of water as it flows out of the orifice into the air is also contracted, the greatest contraction being at a distance from the tank of about one-half the diameter of a circular orifice. Therefore, while the theoretic discharge from the tank is equal to the area of the orifice multiplied by the theoretic velocity of the issuing stream, in practice due to friction, the discharge with a "standard orifice" is only about 0.61 of that amount. A tank supplied with an orifice is frequently a convenient means for measuring water because only the head of water above the centre of the orifice has to be measured in any particular case and then:

where
- $q = .61 \times a \times v = .61 \times a \times 8.02 \times \sqrt{h}$
- q = cubic feet per second and 375q = gallons per minute.
- a = area of the orifice in square feet.
- h = head in feet above the centre of the orifice (measured)
- .61 = an average value

and where, as is generally the case, h is over three times the diameter or vertical height of the orifice.

The sanitary engineer is particularly interested in the flow of water in pipes. In Fig. 20, A represents a reservoir of water, B-C-D-E a pipe conveying the water to a reservoir F at a lower elevation, the water flowing freely into the air at E. An investigation of this case will illustrate some of the fundamental ideas with regard to the flow of water in pipes. As in many practical sciences, theory, in the science of hydraulics, will take one so far when experience becomes necessary and certain facts can only be determined by experiment.

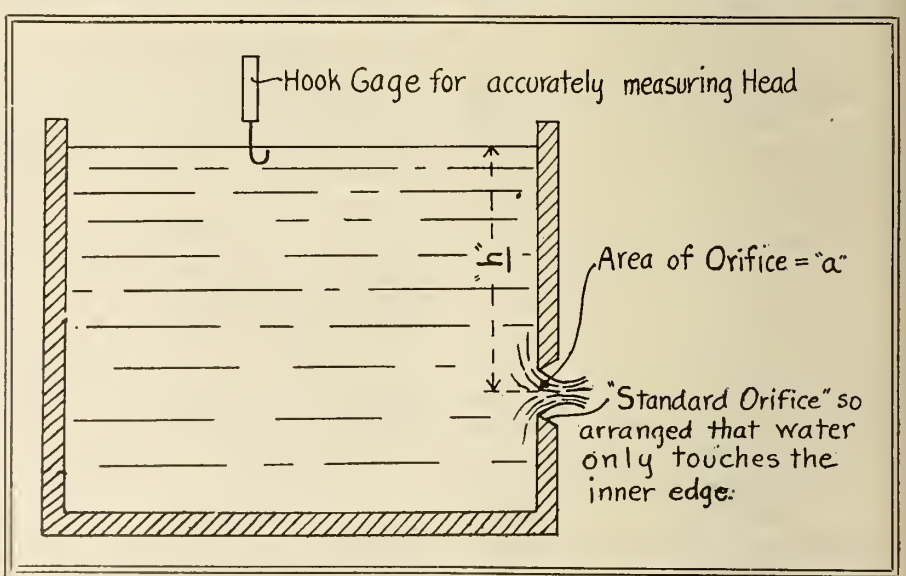

Hook Gage for accurately measuring Head
Area of Orifice = "a"
"Standard Orifice" so arranged that water only touches the inner edge.

Fig. 21.

In Fig. 20 take the pipe B-C-D-E as 4 inches in diameter, and let there be an opening at the end of the pipe at E ¼-inch in diameter. The area of the opening at E will then be less than 1/10 of the area of the pipe. Reservoir A and pipe B-C-D-E can, therefore, be considered as one tank with 100 feet head of water above an orifice at E. By using the formulae previously given in this article it will be found that in such a case the theoretic velocity is 80.2 feet per second and the actual discharge about 6 gallons per minute. If the orifice at E is sufficiently enlarged there will be an appreciable velocity of approach in the pipe BCDE so that in theory the velocity of the stream of water issuing at E should be increased. It is found however that due to friction between the water and the sides of the pipe and to eddies caused in the water by any roughness in the pipe that as the area of the orifice at E is increased the velocity is decreased and becomes very low, especially for small pipes, when the orifice at E becomes as large as the area of the pipe BCDE. This latter is, however, the usual case because although the velocity of the water flowing out is decreased, the total discharge or amount of water flowing is increased and this is what is generally desired.

The loss caused by friction when water flows in a pipe can be represented as a loss of head. Before the water

starts flowing at E there is a head of 100 feet at that point. When the flow begins the head due to the velocity, which without friction would be also 100 feet, is greatly reduced. From observations made in connection with experiments on the flow of water in pipes it is found that the loss of head caused by friction obeys the following laws:—

Loss of Head.

1. Increases with the length of pipe (l in feet).

2. Decreases with an increase in diameter (d in feet).

3. Varies with the square of the velocity (v in feet per sec.).

4. Increases with the roughness in the pipe (friction factor "f").

5. Is independent of the pressure in the pipe.

These laws are expressed in the equation $h_f = f \times \frac{l}{d} \times \frac{v^2}{2g}$ where hf is the head lost in friction. The friction factor "f" depnds not only on the roughness of the pipe but also on the velocity of flow and the diameter of the pipe.

An average value for "f" is 0.02, being, for large pipes and high velocities, about 0.01, to, for small pipes and low velocities, about 0.03. The roughness of metal pipes, due to rust or corrosion, generally becomes greater with age and the value of "f" will therefore also be increased. The information given in table VI is taken from Williams and Hazen Hydraulic Tables.

TABLE VI.

Smooth Iron Pipes Discharging About 30 Gallons Per Minute.

Diam. of pipe.	Velocity.	Loss of head per 1,000 ft. of length
4"	0.89 ft. per sec.	1.24 feet
2"	3.57 ft. per sec.	36.6 feet
1"	13.02 ft. per sec.	850.0 feet

This table aids in showing the loss of energy due to friction that occurs in pipes, especially those of small diameter. Referring to Fig. 20, if pipe BCDE were 4 inches in diameter, to deliver 30 gallons per minute into reservoir F would require the head EK to be only 1.24 feet, while if the pipe were 1 inch in diameter the delivery of the same quantity of water in the same time would require the head EK to be 850 feet. For comparison it might be noted that from a tank a head of water of about 9 feet would discharge 30 gallons per minute through an orifice of 1 inch in diameter. Such a difference cannot but impress one with the loss due to friction in pipes.

Other losses of head that may occur in a pipe are generally small when compared to the friction loss already described. There may, however, due also to friction, be losses:—

1. At entrance of water into pipe.
2. At sharp bends in the pipe.
3. At sudden enlargements or contractions in the pipe.

This relation can be expressed as:

$$H = \frac{v^2}{2g} + \frac{1}{2} \times \frac{v^2}{2g} + f \times \frac{l}{d} \times \frac{v^2}{2g}, \text{ where}$$

$$\frac{v^2}{2g} = \text{head due to velocity.}$$

$$\frac{1}{2} \times \frac{v^2}{2g} = \text{loss of head due to friction at entrance.}$$

$$f \times \frac{l}{d} \times \frac{v^2}{2g} = \text{loss of head due to friction in pipe.}$$

$$\text{which gives } v = \sqrt{\frac{2gH}{1.5 + f \times \frac{l}{d}}}$$

4. At valves in the pipe.

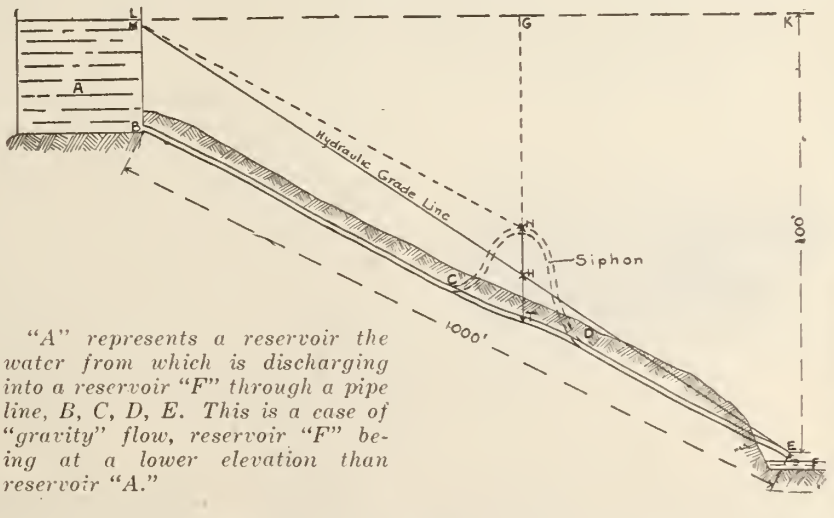
These losses are also determined by experiment. The loss of head at entrance can be taken for average conditions as ½ the head due to the velocity. The other losses of head vary greatly with varying conditions, but for any particular cause the loss of head can generally be assumed to be not greater than twice the head due to velocity.

Considering Fig. 20 we are now in a position to calculate the velocity and discharge from the pipe BCDE 4 inches in diameter. Of the 100 foot head there is left at E when the water is flowing out freely into the air only the head due to the velocity of the issuing stream, the remainder of the head being lost in friction. If v is the velocity at E it will also be the velocity in any part of the pipe of the same diameter which in this case is constant throughout. Then in general the total head or H equals the head due to the velocity plus the loss of head at entrance (B in Fig. 20) and plus the loss of head due to friction in pipe.

In the case under consideration taking f as 0.025 we find that the velocity in the pipe BCDE 4 inches in diameter is about 9.2 feet per second and the discharge of such a pipe at this velocity will be about 300 gallons per minute. Except for the velocity head of 1.3 feet due to a velocity of 9.2 feet per second all the 100 foot head is lost in friction. Take for comparison pipe BCDE as 1 inch in diameter and f for this case as 0.03. The velocity is found to be about 4.2 feet per second and the discharge about 9 gallons per minute. In this latter case practically all the 100 foot head is lost in friction.

Under the conditions given in Fig. 20, a 4 inch pipe will therefore deliver over 30 times more than a 1 inch pipe. From such considerations it can be seen that as a rule it is only the cost of the pipe that limits the size of the pipe recommended by the engineer.

(Continued in next issue.)



"A" represents a reservoir the water from which is discharging into a reservoir "F" through a pipe line, B, C, D, E. This is a case of "gravity" flow, reservoir "F" being at a lower elevation than reservoir "A."

Fig. 22.

New Sanitary and Heating Goods

AUTOMATIC PIPE AND NUT WRENCH.

The Hayward Wrench Co., 700 Cass Ave., St. Louis, Mo., are now offering to the trade a new pipe and nut wrench. This wrench is described as an automatic combination that instantly adjusts itself to any size pipe or nut within its capacity, two motions with one hand being all that is needed to operate the wrench. The makers claim that it will not crush the pipe, but the harder you pull, the tighter it holds. With a

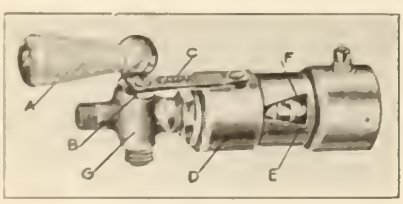
The above illustration shows the Haywood Pipe and Nut Wrench.

quick release and a ratchet movement the automatic adjustment makes it easy to operate. It is also claimed that it will not clog with dirt or grease.

The makers state that the wrench is made of the best quality high carbon drop forged steel, that it is strong, durable and well finished.

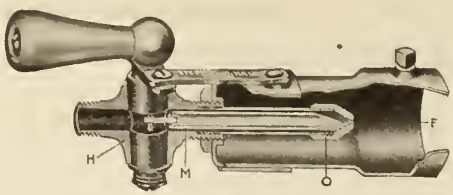
THE HALE GAS MIXER.

The Hale Gas Mixer Mfg. Co., Kansas City, Mo., offers to the trade the Hale Gas Mixer. The cardinal claim made for the Hale mixer is that it maintains continuous perfect combustion, whether much or little gas is being used. This being so, it is self-evident that a saving of gas must follow; and as perfect combustion leaves no residue, there can be no soot to form on cooking utensils, neither can there be present any carbon monoxide—that dangerous gas, so detrimental to health. It is also said to be very sanitary.



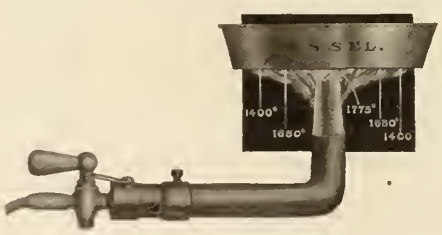
The above illustration shows how the Hale Gas Mixer operates.

The handle (A) has a short arm (B) extending from it at a right angle; to this arm is attached a connecting rod (C) which is fastened to a movable sleeve (D). When handle is moved to turn on gas the same motion also causes the sleeve to be drawn back so as to uncover the air openings (one of which is



The above illustration shows a sectional view of needle valve construction.

shown at E), and when the handle is moved to shut off the gas this operation is reversed, and the air openings are thereby closed. The principle of this action permits just the right amount of air to enter, no matter at what position the handle is placed. As more gas is supplied, more air also is supplied, and vice versa. The orifice of the needle-valve tip (F) being small, the velocity of the gas passing through it generates a force that acts upon the atmosphere with an injector effect, drawing in the air through the air openings. The size of these openings allows only the right amount of air to



Showing the Hale Bunsen Burner as used with the Hale Mixer.

enter that is necessary for perfect combustion. The needle of the needle-valve is connected with an eccentric on the core of the gas-cock at G, and operates simultaneously with each movement of the cock handle, supplying or shutting off the gas at the valve orifice (F).

The Hale Bunsen Burner consists simply of a piece of pipe, one end of which is bent at a right angle, as shown. The claim is made that it is low in cost, easy to remove, clean and replace; and when used in conjunction with the Hale gas mixer, as illustrated, is claimed to be the most economical and efficient burner ever devised.

COUNTRY PLUMBING PRACTICE.

Show me a man's book shelf and I'll tell you what kind of a man he is. Books are the concentrated power behind the man of business; books, more books, should be the cry of every individual these days. The man who desires to keep in line with the times must be the possessor of a number of good books, whatever his calling may be, and sanitary and heating engineers are no exception to the rule.

One of the latest books published in the interest of the trade to come to our notice is one by Wm. Hutton, entitled "Country Plumbing Practice." It is a book of over 300 pages, well bound and printed on good serviceable stock. The illustrations are clear and instructive; not mere pictures by any means, and should be on the book shelf of every sanitary and heating engineer in Canada. It contains 19 chapters, which deal with subjects such as:

Gasoline engine practice.
Steam driven pump.
Hydraulic rams.
Selection of water supply.
Methods of raising water.
Distribution of water supply.

Sewage disposal from isolated buildings and a dozen more chapters of interest to every sanitary engineer.

Further particulars may be procured by writing for same to Book Department, MacLean Publishing Co., Ltd., University Avenue, Toronto.

NEW CATALOGUES.

One of the most recent of catalogues to be issued to the trade is that now being issued by the Rumsey Company, Inc., Seneca Falls, N.Y. It is a handy size and fully illustrated. Some very interesting information to the trade is included, which makes it of value to all engaged in the installation of pumps of any description. These books may be procured free on application from the above address.

Don't talk about a man behind his back; that is the place to kick him. If you are an employee do not "knock" your boss when he isn't around. That doesn't do you any good, for the only ones to hear you are those with no power to better your conditions. And if you don't like your employer go out and get another one, rather than to kick about the man who is making it possible for you to eat and dress well and have pocket money, etc.

Practical Course for Sheet Metal Workers

ARTICLE No. 20 OF SERIES

By CHARLES SEIVERS

In Fig. 1 is shown the side view or side elevation, and an end view of a tee pipe or a joining of two pipes at right angles, in this case the pipes are of unequal diameters. In Fig. 2 is shown a side view and an end view of a branch or T-Y between two pipes of unequal diameters. In developing the pattern of these branches, the same method is adopted in each case. Having drawn a side view and end view, as shown by A-B-C-D-E-F-G and H on side view and K-L-M-N-O on the end view, the next step will be to develop the line of the joint or junction between the two pipes. On the end of the branch at A-H and K-L draw a half section of the branch pipe, and divide into a number of equal parts. From these points draw lines at right angles to A-H, extending them past B and G, and on the end view draw the lines from points on section at right angles to K-L, extending them until they join the circumference of the large circle O. From the points where the lines drawn from section on end view, join the circumference of large circle O, draw lines parallel to C-F, extending them until they join or intersect the line drawn from corresponding points on side elevation as shown at lines from point 5 intersecting the ones from points 5, etc. A line drawn through the points thus obtained will give the line B-T-G from which to obtain the cut required on the branch.

To develop the pattern of the branch, draw two parallel lines as R-R and S-S. Then erect lines at right angles to R-R, joining them to S-S as shown at R-S-R-S. From these points mark off the spaces on section drawn on A-H or K-L, repeating to complete circumference. Starting at space I measure from the line A-H to where the line joins the cutting line B-T-G, and set on the line 1 at end of pattern, measure off distance on line 2 and set off on line 2, repeat on lines, 3, 4 and 5, then work back on 4, 3, 2 and 1, which makes one-half the pattern. Repeat in the same way to complete the full pattern. A line drawn through the points thus obtained will give outline of the required pattern. The branch shown in Fig. 2, is worked out in a similar manner.

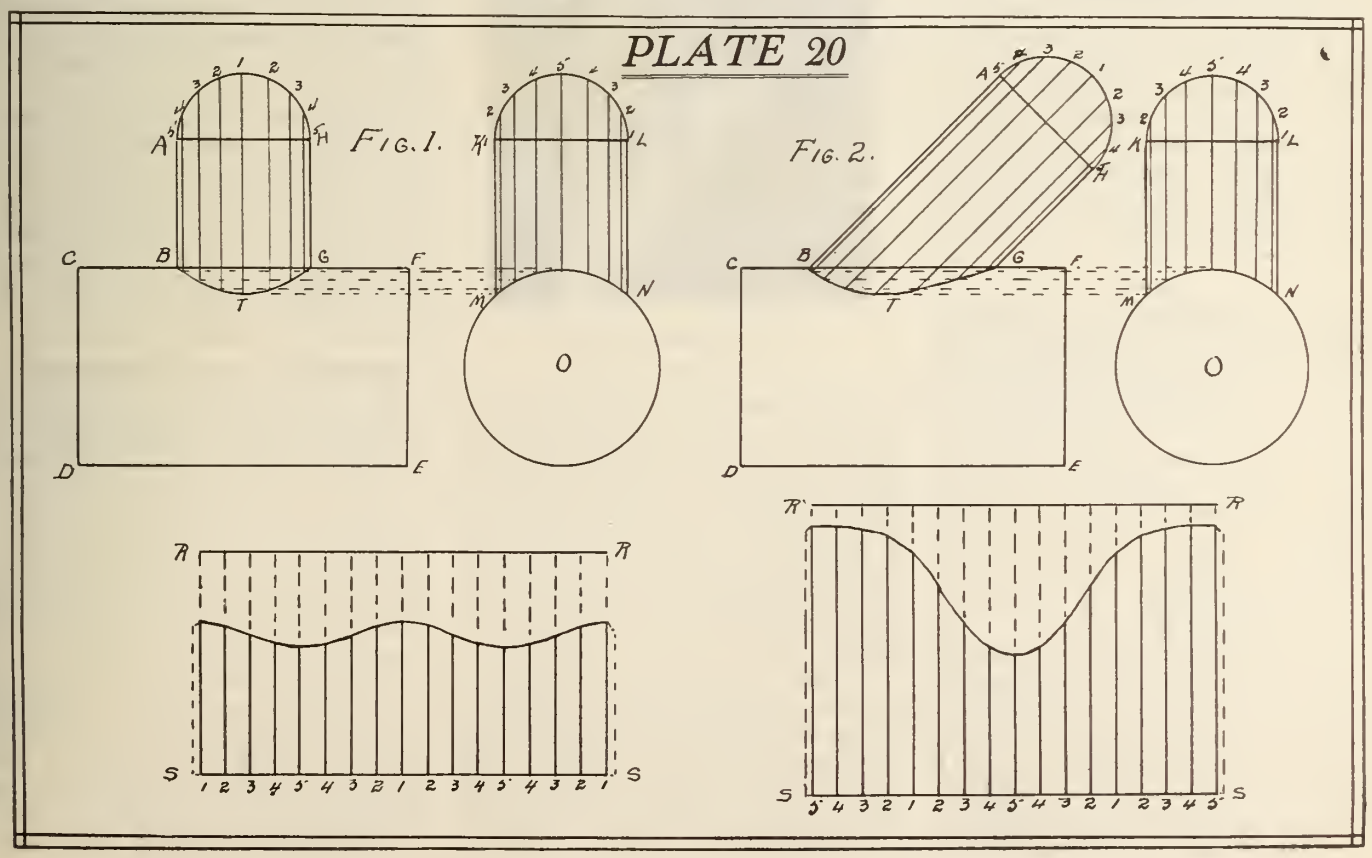
DURAND'S POINT OF VIEW.

J. A. Durand, of The Durand Hardware Co., Montreal, whose chief line is builders' hardware, was asked, considering the falling off in building, if he were thinking of taking on any new lines. He replied that his location was not suited to household or sporting goods therefore he intended continuing in builders' hardware.

The worst, Mr. Durand said he believed was past. He did not think there would be anything as bad as the present winter, and he calculated that the war would be over by fall, following which he expected a slight boom.

He admitted they were feeling the depression, but would pull through without being compelled to branch out into new lines. Prices were being reduced both by manufacturer and retailer, and it was necessary for all to sharpen their pencils and go hard after business.

The things you cannot afford to buy and pay for when you get them are usually things you can get along without.



EXTENSION TO PLANT.

The Canada Metal Co., Ltd., Toronto, Ont., are making extensions to their factory at a cost of $15,000.

CONTRACTS AWARDED.

The city council awarded the contract for the supply of cast iron water pipe to the National Iron Works, Ltd., Toronto, at $30.25 per ton, and for specials, valves, hydrants, etc., to the Kerr Engine Works, Walkerville, Ont.

VISITS TORONTO.

T. Cotter, of Messrs. Cotter Bros., sanitary heating engineers, Winnipeg, was in Toronto on a visit for a few days.

He would not be very favorably impressed with the conduct of the weather man because it rained several days.

WINNIPEG PLUMBERS ELECT OFFICERS.

George Wharton was elected president of the Plumbers' Union recently. Other officials for the current year are: C. Murdoek, vice-president; J. Kennedy, treasurer; D. Young, recording secretary; W. G. Lumsden, financial secretary and business agent. Delegates to the Trades Council. Thomas Elder, James Weir, and W. G. Lumsden. Trustees: Sam Martin and George Wharton.

TORONTO BOYS VISIT PORT HOPE.

The Toronto Society of Sanitary and Heating Engineers are to be envied this year. They appointed an outing committee at the early part of the season, whose duty it was to provide and arrange a series of pleasant events. This committee consisted of the following gentlemen: Jno. E. Fullerton, Thos. Maxwell, F. Gentle, J. Cracknell, N. Swanston, Jno. Wright, and last but not least, G. F. Frankland.

The final outing arranged was that of a visit to Port Hope, when upwards of 100 took in the trip. En route games were played, stories were told and retold, and they were "some stories" from all accounts—refreshments were furnished which made the two hours train-ride feel more like 30 minutes. Friend Fullerton handed out caps to all the members. Some of which, as the Irishman said, "fitted too soon." Some of the boys had to put a pleat in the back of the caps to make them fit, while others became a little swelled-headed. Upon arrival at Port Hope W. H. Bush, the worthy manager of the Standard Ideal Company, Ltd., greeted the party. Autos were in readiness which took every one to the hotels for dinner, as guests of the afore-named company. The repast being over, the whole party were again treated

E. S. STACK, Boston,
Inventor of the Stack gas water heater.

to another auto ride to the plant of the Standard Ideal Co. Several members of the staff escorted the party through the plant, describing the various operations which go to make up an ordinary piece of cast iron enamelware. No one can imagine the great attention given to every detail, all of which is very necessary in the manufacture of such a commodity.

It may sound a strange assertion when we tell our readers that the manufacture of cast iron enamelware is one of the most important industries in the whole of the Dominion of Canada, and when members of the trade are not doing their level best in getting after new business, they are unconsciously causing several thousands of men to work only part time, plants are only running part time and money to the extent of several millions of dollars is being kept at a standstill.

Not one of those present at Port Hope could help but realize the magnitude of such an industry.

After passing through the plant teams were brought together to take part in a game of baseball, while the members of the Port Hope lawn-bowling club played the Toronto boys a game of bowls.

It was "some experience" to not a few of the sanitary engineers when the lawn bowling started, and more than once the bowls from one rink made goo-goo eyes at the kitty on another rink. The final results, however, reflected great credit upon both sides, the sanitary engineers, because of the fact that one-half had never seen a bowling match played; and the Port Hope players for the way they coached their own opponents. It certainly required a great deal of patience on the part of the Port Hope boys.

Supper was afterwards served when all joined in a little social intercourse on the platform at the railway station. The train pulled in to carry the Toronto boys home, and each and everyone took away with him a smile as shiny as the porcelain finish of the cast iron enamelware of Port Hope.

MUELLER MFG. CO'S PICNIC.

One of the most successful picnics in the history of the Canadian factory of H. Mueller Mfg. Co., Ltd., brass manufacturers, Sarnia, took place Saturday, July 24th, when upwards of seven hundred people boarded the steamer City of Toledo for Tashmoo Park as members and guests of the Employees' Aid Society of the H. Mueller Mfg. Co., Ltd., on their third annual picnic.

Not a mishap occurred during the whole day to mar in the slightest degree the perfect enjoyment of a perfect outing. Arriving at Tashmoo Park about eleven o'clock the ball game was immediately put on between the factory hands and the office staff. This contest

was an uproarious event, marked by excessive "rooting," and a larger offering than usual of "thataboy's"—"put her over ol' timer's" "right in the grooves," and by much heckling by the opposing players and their sympathizers. Judged by the score—23 to 27, the ball game didn't approximate the work of a national league, but it was fought every inch of the way, and up till the fifth innings the box of cigars was anybody's. Owing to the heat and the excessive strenuousness in this innings the office boys didn't carry on exactly according to Hoyle, with the result that the factory chalked up several tallies which eventually decided the game.

This was the line-up of the ball game: Factory—Dwyer, pitcher, Draper, catcher; Law, first base; Nelson, second base; R. Nelson, third base; Atchison, centre field; Wise, right field; Cooper, left field; Aldridge, short stop.

Office—shaw, pitcher; Thrift, catcher; Riggin, first base; McMann, second base; Prowse, third base; Jerowski, centre field; Martin, right field; Proctor, left field; Murray, short stop.—Umpire Munroe.

Jack shaw the office pitcher retired at the end of the fourth in favor of Charlie Murray.

No member of either team succeeded in batting out a homer, but the razor offered for this feat was handed to Prowse, who scored a three-bagger.

Immediately at the conclusion of the ball game, the other events were pulled off, under the direction of the events' committee, and such was the length of the programme that it was not concluded until just before the boat left for home at 5.20. From that time until the boat reached South Park there were contests of various sorts decided on the boat, so that the events committee were the busiest men imaginable from the time the picnic reached Tashmoo until the arrival in Sarnia.

Much credit is due Mr. Bartlett and the other members of the committee for the despatch with which the various events were pulled off, and for the fair and impartial manner in which the decisions were given.

Notes.

"Buzz" McMann says he could have won the razor but as he is raising a "Charlie Chaplin," he really hasn't any use for it, don't you know.

The factory boys are the huskiest rooters.

The losers of the ball game said they got more of the cigars than the winners.

Neither Jack nor "Buzz" could get the range of the teddy bear—the former dropping a perfectly new simoleon from over-confidence.

Charlie Murray can high jump, don't make any mistake about that.

"Buzz" put on a little ear stuffing contest on the boat on the way back.

Mr. Mueller had no serious difficulty with his trousers this year.

The Detroit aggregation who were at Tashmoo on Saturday, didn't suffer from backwardness to any serious extent. They grabbed the diamond before the Mueller teams were done with it, and "hogged" the race track while it was being used by our boys.

If any person on the picnic didn't have a good time it wasn't the fault of the management or the place or the weather.

Nemo Munroe, the "ump," affected a lot of farcial national league mannerisms.

Several prizes were given out, on the steamer City of Toledo, both going to and coming from the park, and also while at Tashmoo Park. The prize committee used their own discretion as to the nature and value of these special prizes.

The following committees had charge of the picnic.

Prize committee—E. W. Allen, chairman; C. W. Murray, J. Shaw.

Reception committee—O. B. Mueller, chairman; F. L. Riggin, C. G. Heiby, W. H. Bartlett, P. W. Blair, R. S. Thrift, B. Palmer.

Field events and races committee—W. H. Bartlett, chairman; John Burkam, C. W. Barber, F. J. Finkbeiner, R. VanHorne, C. W. Padgitt, S. J. Schultz.

Publicity and Programme committee—F. L. Riggin, chairman; A. H. Ashton, S. F. Tichborne.

Baseball committee — J. Aitchison, chairman; C. Cooper, C. W. Havers, T. E. McMann.

Dancing committee—C. G. Heiby, chairman; A. M. Carroll.

A BAD LOYALTY.

To some people expressing an opinion is like raising a standard.

And yet I should not put it that way, for that implies that loyalty to one's opinions is commendable, and it isn't.

To express an opinion is merely to record your mental reaction upon the facts that have so far come before you. Suppose to-morrow brings you new facts. Is there any fine loyalty in refusing to let your mind react upon these, too?

"Opinion is knowledge in the making." If you artificially arrest this process, instead of making knowledge, you ossify your opinion into prejudice.

"All my old opinions were only stages on the way to one I now hold," says Stevenson, "as life itself is only a stage on the way to something else."

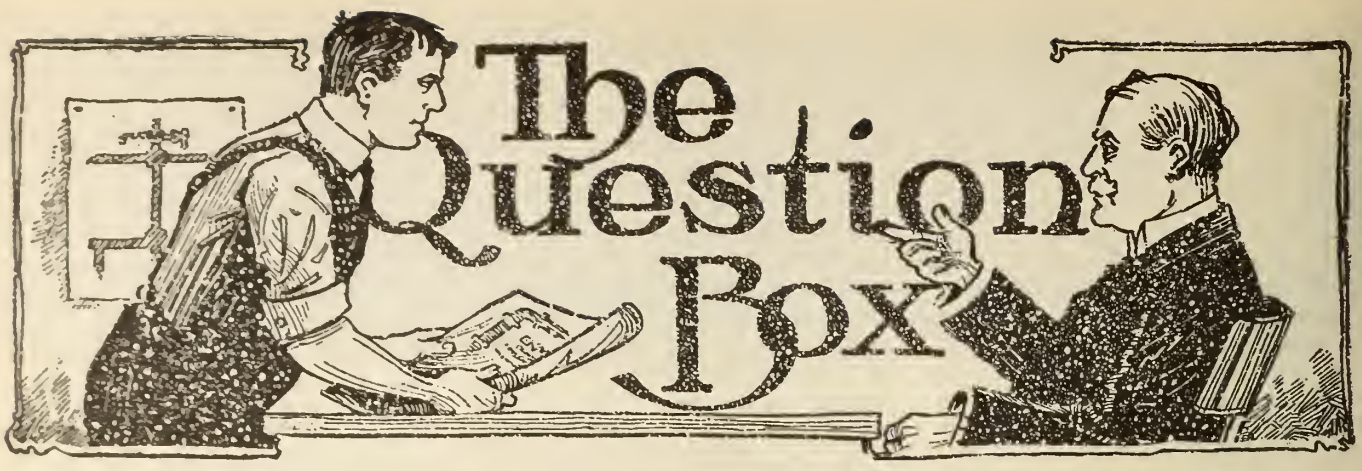
No one need be ashamed of having changed an opinion. It is sometimes hard when you have been identified in your friends' minds with one point of view to come out for the other side. It means surprise, questions, perhaps thoughtless ridicule. But remember that the deeper meaning is that you haven't stopped thinking.

I suppose the fundamental reason why we hate to admit a change of opinion is that we are thereby saying, "I was wrong." But which is worse, to have made a mistake, or to continue to make it? As someone has said, "He who never changes in his opinions never corrects his mistakes and will be no wiser on the morrow than he is to-day."

Everyone makes mistakes and keeps making them. The new opinion you have formed may be no nearer the truth than the old. It is only a pledge that your mind is still open and that you love truth more than you do the stability of fixed opinions.—Ruth Cameron.

OUR DUTY TO THE BLIND.

From Vienna, from Paris and from Montreal come reports of arrangements that have been made for the assistance and instruction of soldiers blinded in the war. The French report states that a larger proportion of the combatants have been, and will be, made blind in this war than in any previous war, on account of the difference in weapons and in the character of the fighting. Ontario has provided amply for the instruction of blind children, but has not been a leader in provision for ameliorating the condition of the adult blind. With the added claims of the soldiers who will come home from Europe sightless, action in this matter cannot be long delayed. Our blind soldiers and fellow citizens must not be left to wear out their lives in idleness and sorrow, when timely aid and proper instruction can enable them to resume their places as useful members of the community. The Ontario School for the Blind at Brantford is maintained for the education of children whose sight is so defective that they cannot be taught in the regular public schools. This school is not intended for adults, and it cannot do what is required for the class above referred to, without reducing, if not destroying, its efficiency as an instructor of the young. Bona fide residents of Ontario, between the ages of seven and twenty-one, who cannot see to read ordinary type without injury, are admitted to the School without charge for board, tuition or books. Applications should be made to the Principal, H. F. Gardiner, Brantford, in time to have all arrangements completed before the opening of the session in September.



Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

CESSPOOLS OR SEPTIC TANKS.

Editor Sanitary Engineer. — Would you kindly inform me or publish through the pages of The Sanitary Engineer a description of the most approved cesspools and septic tanks for village use. Which do you yourself prefer? Cesspools or septic tanks?

J.R.M. Ontario.

We do not approve of any kind of cesspool whatever and therefore have not described one. We do not think the provincial Board of Health would permit one to be built. If they hear of one being constructed, it would very likely have to be filled up.

Below we show two styles of septic tanks, one fitted with a Quinn valve, the other with a syphon. The size of the dosing chambers in both cases should be large enough to allow from 15 to 20 gallons of fluid for each person using the sanitary fixtures per 24 hours. That is the dosing chamber should flush not less than once every 24 hours. The irrigation tile pipe should not be laid more than 12 inches below the surface of the ground with not more than from ½ inch to 1 inch fall in ten feet.—Editor.

SOLDERING KINKS.

By J. E. Noble.

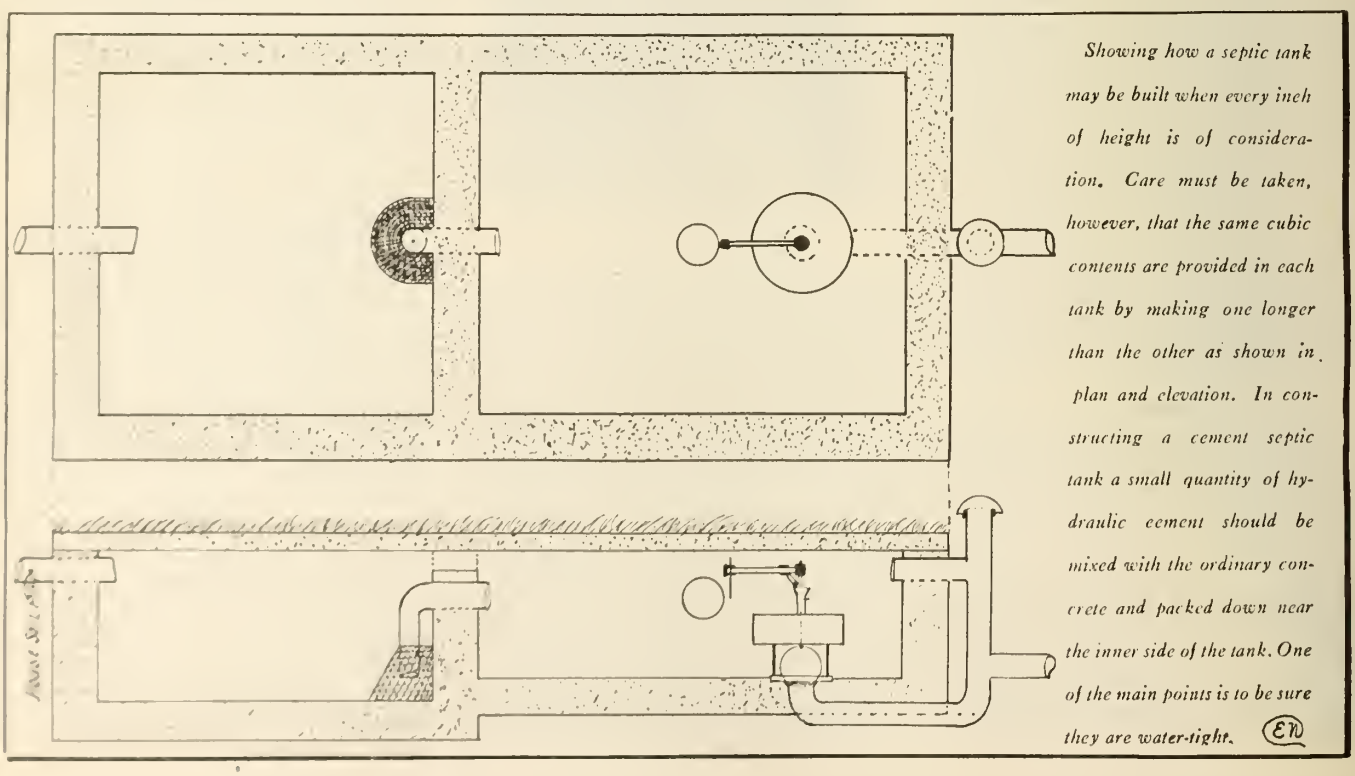
The following "soldering tables" have points not usually found in the ordinary plumber's book. The information contained in them may be of value to some of the subscribers of The Sanitary Engineer, or their assistants.

Some time ago I made considerable repairs to a number of church windows and I found that neatsfoot oil made an excellent flux to solder the thin sheet lead casing around the small glass squares.

This oil does good work in soldering block tin pipe and pewter, care being taken to use an iron only just hot enough to melt the solder.

In soldering cast iron, wrought iron, steel or galvanized iron with soft solder, it is a good idea to have an ordinary brick close at hand, with some sal ammoniac on it, as the tinning leaves the soldering copper, or iron, a few rubs on the brick and sal ammoniac with the

(Continued on page 40.)



Showing how a septic tank may be built when every inch of height is of consideration. Care must be taken, however, that the same cubic contents are provided in each tank by making one longer than the other as shown in plan and elevation. In constructing a cement septic tank a small quantity of hydraulic cement should be mixed with the ordinary concrete and packed down near the inner side of the tank. One of the main points is to be sure they are water-tight. EN

Efficiency of the Water Test

Pressures to Which a Soil Pipe Stack is Subjected According to Height — A More Uniform System Should be Adopted, so That Every Joint in the Soil Pipe, or House Drain Can be Properly and Effectively Tested.

IN the May 15 issue of The Sanitary Engineer, the subject of water testing was taken up to some extent. It was shown that no portion of a stack when being tested by water could be subjected to a uniform pressure. Then again, no matter what size a stack may be in diameter, the pressure would be the same, providing the heights were equal. The table which showed the pressures at various heights is based upon .43 per square inch one foot in height, which is near enough for the average sanitary engineer. However, if it were necessary to procure absolutely accurate figures, the height should be multiplied by .4335. For instance, to find the pressure per square inch on a stack pipe 53 feet high, any diameter, multiply $53 \times .4335 = 22\frac{9755}{10000}$, or nearly 23 lbs.

Height of Pipe	Pounds per Square Inch Pressure	Height of Pipe	Pounds per Square Inch Pressure	Height of Pipe	Pounds per Square Inch Pressure	Height of Pipe	Pounds per Square Inch Pressure
1	.43	26	11.26	51	22.09	76	32.92
2	.86	27	11.69	52	22.52	77	33.35
3	1.30	28	12.12	53	22.95	78	33.78
4	1.73	29	12.55	54	23.39	79	34.21
5	2.16	30	12.99	55	23.82	80	34.65
6	2.59	31	13.42	56	24.26	81	35.08
7	3.03	32	13.86	57	24.69	82	35.52
8	3.46	33	14.29	58	25.12	83	35.95
9	3.89	34	14.72	59	25.55	84	36.39
10	4.33	35	15.16	60	25.99	85	36.82
11	4.76	36	15.59	61	26.42	86	37.25
12	5.20	37	16.02	62	26.85	87	37.68
13	5.63	38	16.45	63	27.29	88	38.12
14	6.06	39	16.89	64	27.72	89	38.55
15	6.49	40	17.32	65	28.15	90	38.98
16	6.92	41	17.75	66	28.58	91	39.42
17	7.36	42	18.19	67	29.03	92	39.85
18	7.79	43	18.62	68	29.45	93	40.28
19	8.22	44	19.05	69	29.88	94	40.72
20	8.66	45	19.45	70	30.32	95	41.15
21	9.09	46	19.92	71	30.75	96	41.58
22	9.53	47	20.35	72	31.18	97	42.01
23	9.96	48	20.79	73	31.62	98	42.45
24	10.39	49	21.22	74	32.05	99	42.88
25	10.82	50	21.65	75	32.48	100	43.31

To clearly show the difference between the two rules, that of basing our calculations upon .43 per sq. inch per foot head, and .4335, we will turn to Fig. 2, which shows a soil pipe stack 33 feet in height. The pressure at foot of stack is based upon .43. Multiply the height, viz., 33 feet, by .43 and we find the result is $14\frac{19}{100}$, or nearly 14¼ pounds per square inch, whereas by using .4335 the result would be $33 \times .4335 = 14\frac{3,055}{10,000}$, or just over 14¼ lbs. per sq. inch.

ACCIDENT PREVENTION ASSOCIATION.

It is easily understood that the prevention of all the accidents possible in connection with the mechanics we have working for us, will necessarily lighten our share of assessment payable to the Workmen's Compensation Fund.

This being so, nothing would seem more sensible than the following Notice To Workmen Regards Safety First, which has been adopted by the Purdy-Mansell Company, of Toornto. These notices are placed in each journeyman's tool box, on the jobs, and in the shop:

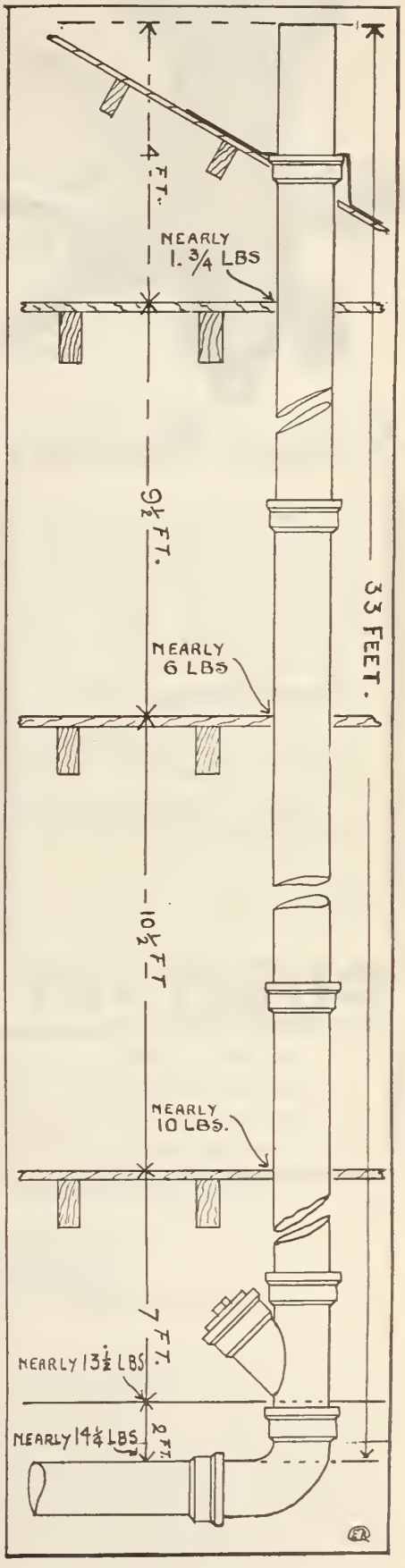
SAFETY FIRST.

Every employee must see that all scaffolding, ropes, ladders, etc., are in a safe and proper condition before using them.

Furthermore, they must not go in any dangerous place before making everything safe.

By order,

Purdy-Mansell, Ltd.



Showing the various pressures a stack is subjected to when water test is adopted.

Saving or Wasting?

The manner in which you handle the drinking water problem in your plant may seem to be a small matter to you --but investigate. The results will be surprising.

The old-time faucet is costly. Running hour after hour, day after day, its ceaseless flow is costing you money, yet without any better service.

Puro Saves 35%

A Puro Sanitary Drinking Fountain will cut that water bill 35%. We can prove that it has done that for others.

It will give every employee a safer, saner draught of bubbling water free from the contamination of the common drinking cup.

In a word, it is the only sanitary Drinking Fountain that is really safe, sanitary, simple, automatic in control, and easy to attach.

"PURO -FY"

(MADE IN CANADA)

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company

147 University Ave., Toronto, Canada

Advertising

"Advertising is the education of the public as to who you are, where you are, and what you have to offer in the way of skill, talent or commodity. The only man who should not advertise is the man who has nothing to offer the world in the way of commodity or service."—*Elbert Hubbard.*

SOLDERING KINKS.

(Continued from page 38.)

addition of a drop or two of solder will retin the soldering iron without the use of a file. An iron hot as can be made without burning off the tinning should be used in soldering the metals mentioned in the foregoing and also for galvanized steel.

Numerous pastes are made and sold as non-corrosive fluxes for soldering brass, copper wires, etc. They are usually composed of mixtures of glycerine and resin, or vaseline and chloride of zinc, or powdered sal ammoniac and vaseline and resin, or some such mixture.

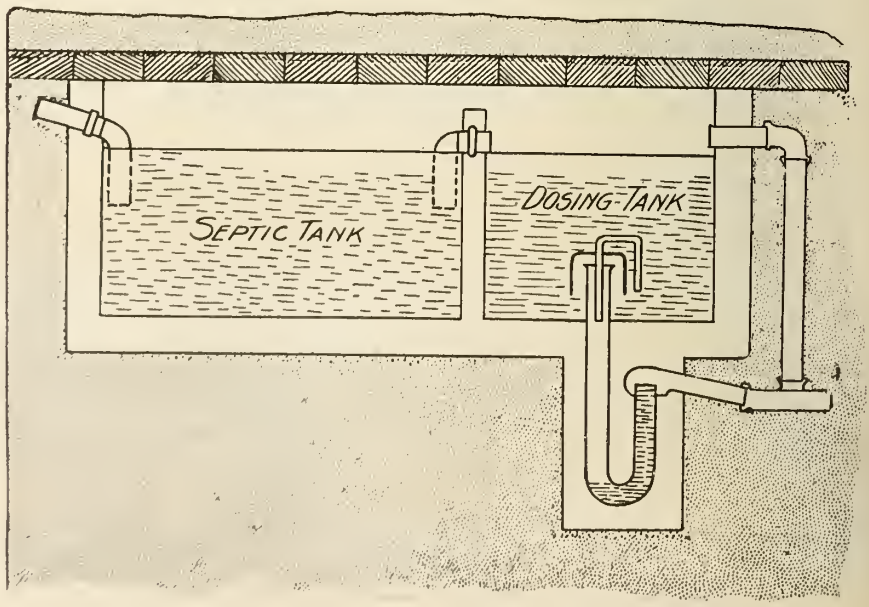
Of course, hard soldering must be done by blow pipe or blast and is usually called brazing and the solder is known as spelter. A point not generally known is that most solders deteriorate with age if kept for a long time in damp atmospheres. Personally, I can not state the cause, but probably some sort of galvanic action is set up with certain mixtures of metals.

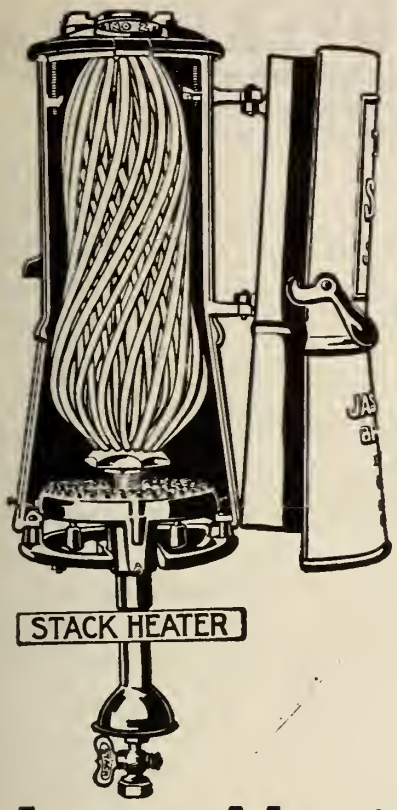
TABLE 1.

Metal to be Soldered.	Flux.	Soft Solder Tin	Soft Solder Lead
Brass, Gunmetal, Copper	Chloride of zinc, resin or chloride of ammonia	66	34
		63	37
		60	40
Lead	Tallow or resin	40	60
Block tin	Chloride of zinc, or needsfoot oil	95	5
Tinned steel	Chloride of zinc or resin	65	35
Galvanized steel	Spirits of salt (hydrochloric acid)	60	40
Zinc	Chloride of zinc (hydrochloric acid)	50	50
Pewter	Gallipoli or needsfoot oil	99	1
Iron or steel	Chloride of ammonia (salamonaic)	50	50
Gold	Chloride of zinc	65	35
Silver	Chloride of zinc	65	35
Bismuth	Chloride of zinc		
	(Solder for bismuth) bismuth 34	33	33
Aluminum	Stearin for flux		
	(Solder for aluminum)		
	Zinc 25, aluminum 3, phosphor 2	70	

TABLE 2.

Metal to be soldered.	Flux	Hard Solder. Copper	Zinc	Silver	Gold
Brass, soft	Borax	22	78		
Brass, hard	Borax	45	55		
Copper	Borax	48	52		
Gold	Borax	20		13	67
Silver	Borax	18	12	70	
Cast iron	Cuprous oxide	55	45		
Iron or steel	Borax	64	36		





THE SECRET OF POWER
IN
The Stack Gas Water Heater

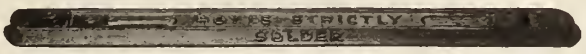
Which will receive and absorb the heat quickest, thus heating the water quickest and hottest, the cluster of small pipes of which the STACK is made, with the relatively large heating surface surrounding the small columns of water, or the large pipe with the larger column of water appearing in all coil heaters?
Your own intelligence will make the answer.

Write for Booklet.

EASILY SOLD. **BIG PROFITS.**

James Morrison Brass Mfg. Co., Limited
93-97 Adelaide Street West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO
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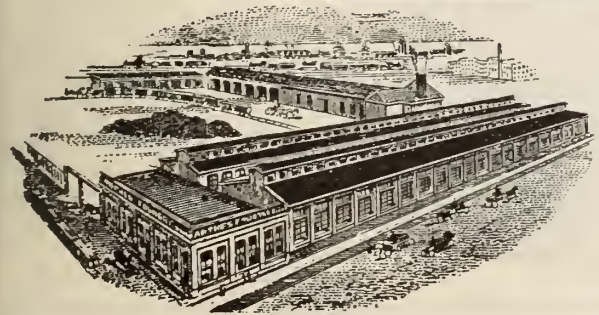
TORONTO **ANTHES FOUNDRY LIMITED** **WINNIPEG**



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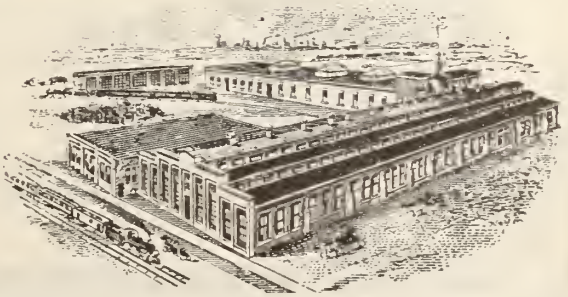
AND
FITTINGS



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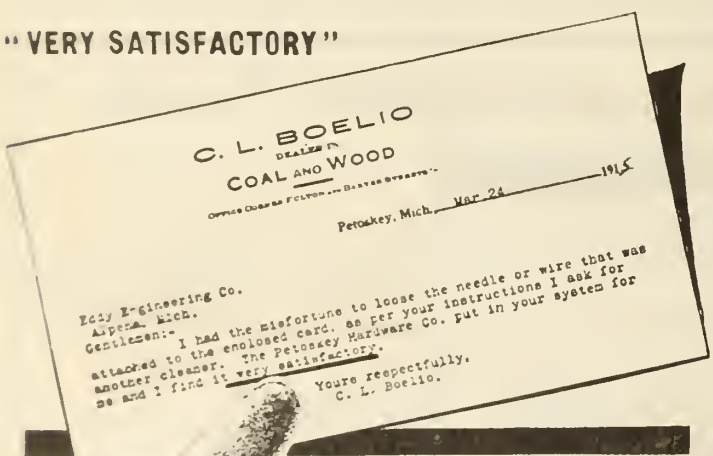
"VERY SATISFACTORY"


C. L. BOELIO
DEALER IN
COAL AND WOOD
Petoskey, Mich. Mar 24 1915
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I had the misfortune to loose the needle or wire that was attached to the enclosed card, as per your instructions I ask for another cleaner. The Petoskey Hardware Co. put in your system for me and I find it very satisfactory.
Youre respectfully,
C. L. Boelio.

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We manufacture in Canada.

Write for full particulars

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"ATLAS"

A Laundry Tray That Lasts

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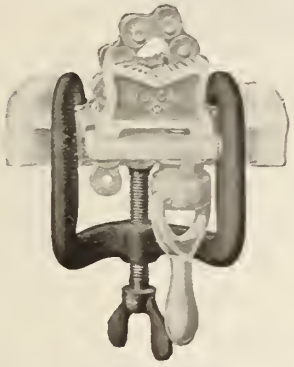
"The Canadian Newspaper for Investors"

A want ad. in this paper will bring replies from all parts of Canada.

WILLIAMS' "VULCAN" CHAIN PIPE VISES

Are Handier Than Ever Now!
With a Clamp for Bench Work



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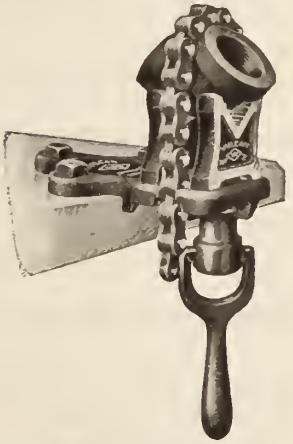
And a Light Mount for Field Work

Firm and portable, and furnished with or without the "Legs" of Standard Pipe Sizes, simple and convenient, that fills a long-felt need.

Vulcan Chain Pipe Vises are First Aid to Plumbing Work



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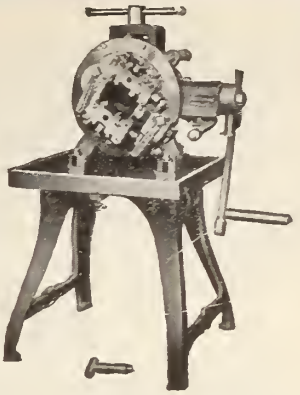

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Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

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THE ARMSTRONG MFG. CO.
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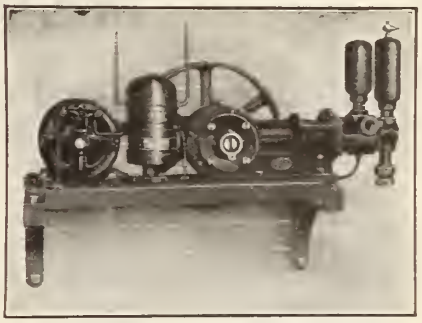
BRIDGEPORT, CONN.
WRITE FOR CATALOGUE

The Paul Electric Motor Pump



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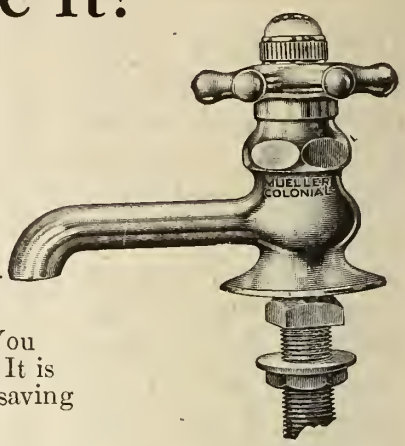
Compare it with other goods—make your investigation as thorough, and as rigid as you can. We know that your ultimate decision will be for

MUELLER
Colonial Self-Closing Work

MUELLER Colonial Self-Closing Basin Cock.



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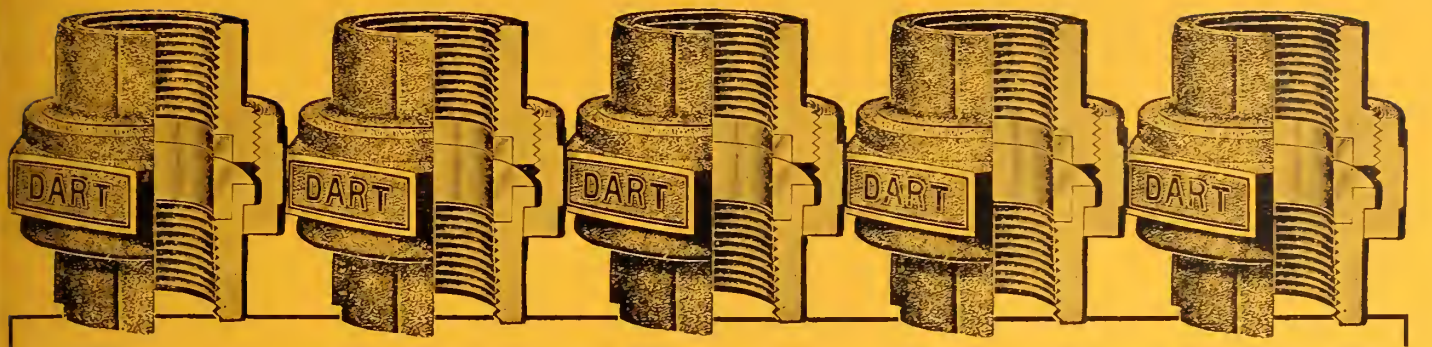

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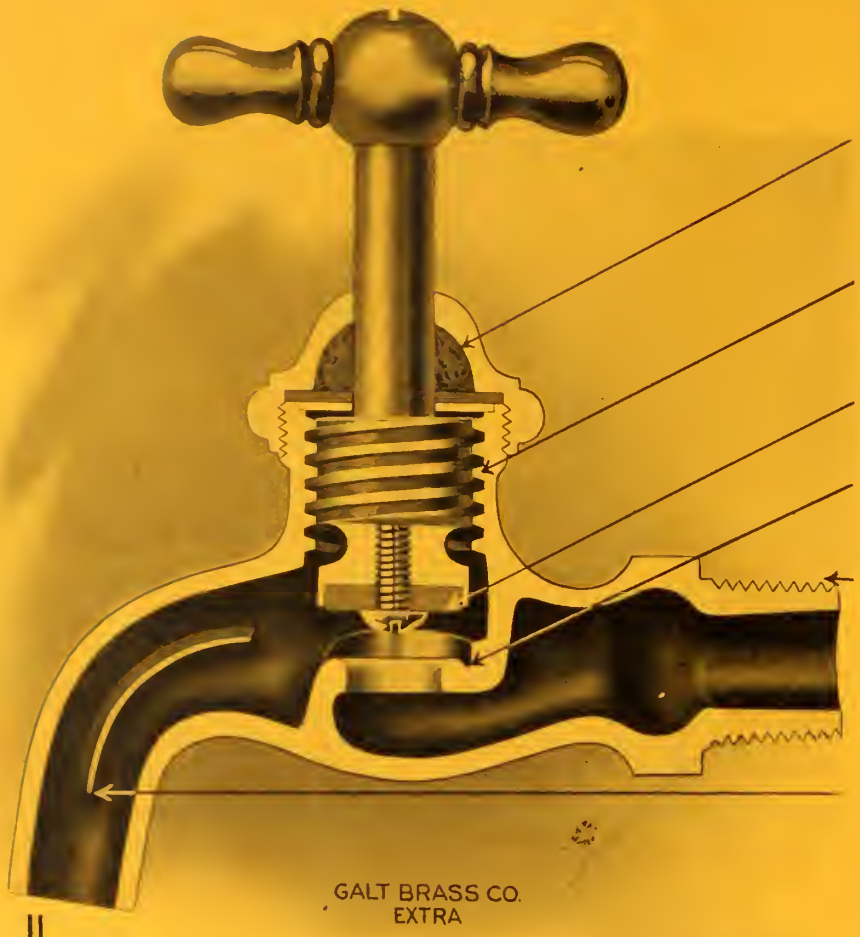

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PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX | Publication Office: TORONTO, SEPTEMBER 1, 1915 | No. 17

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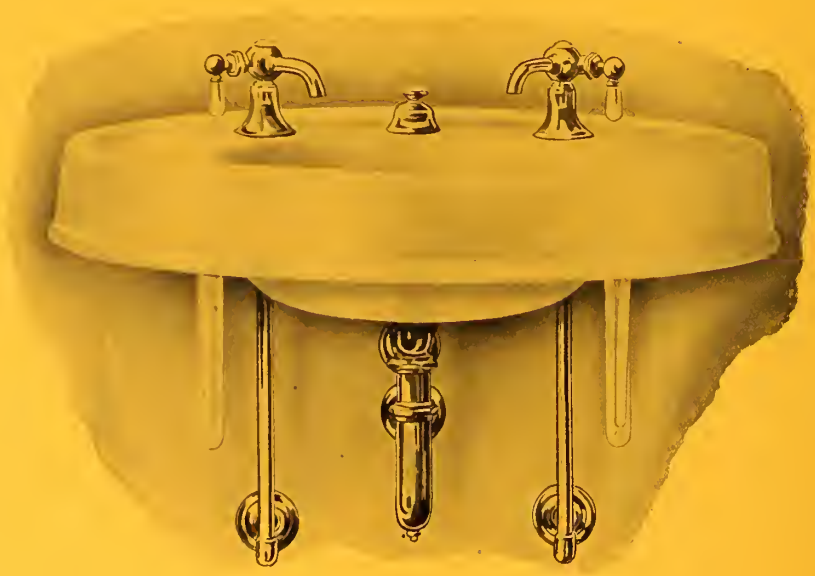

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We have challenged the world to produce a Heater within 25% as good as the Presto.

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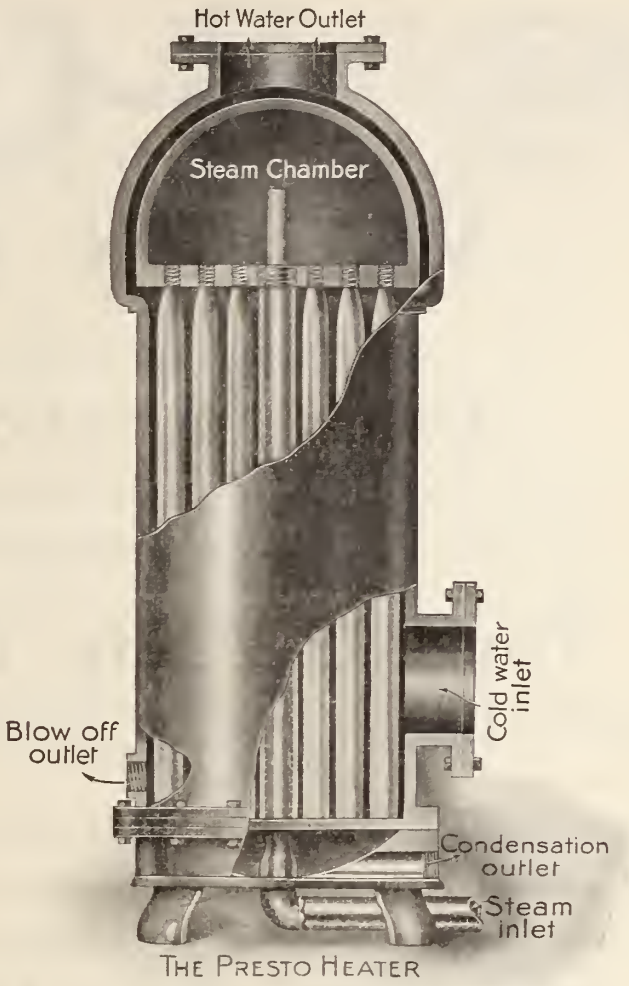

THE PRESTO HEATER

Any heating engineer who is interested in the correspondence we have had in connection with our challenge can have full particulars by writing for it. It makes interesting reading, in fact it is quite amusing.

We shall now commence to tell you something about the Presto heater.

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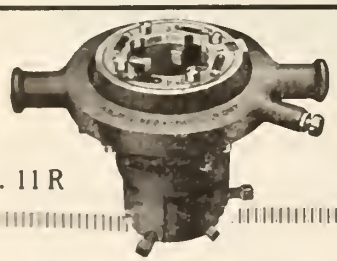

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Capacity, 1" to 2", inclusive, Right or Left.

Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

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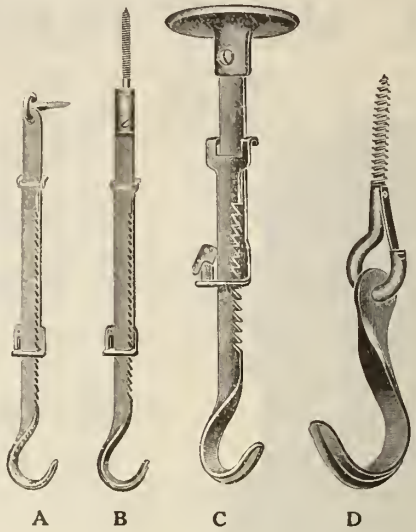

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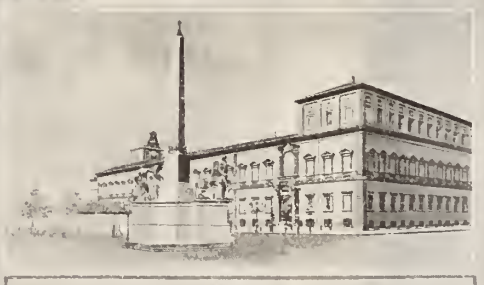

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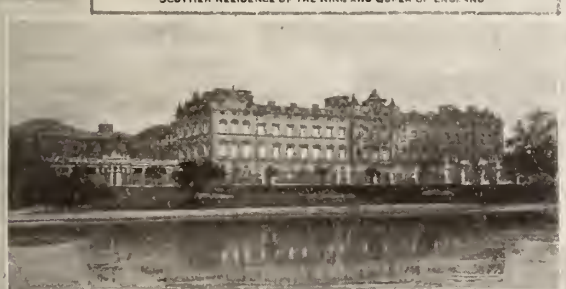

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PALACE OF THE KING OF THE BELGIANS
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Our Factory will be Open to Visitors During the Exhibition

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To sell goods successfully one must know the goods one has for sale.
You cannot know too much these days about the line you handle.
Increased profits are to be desired by every Sanitary Engineer these days.
We can show you how to make them. Call and see us during Exhibition time.

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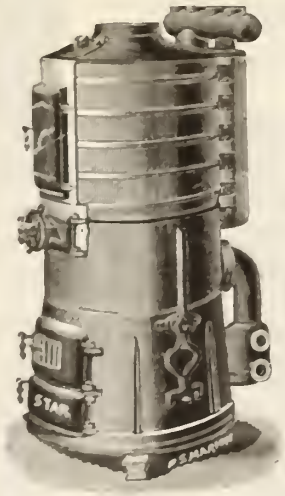

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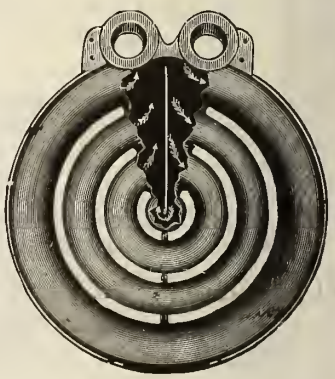

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Manufactured by

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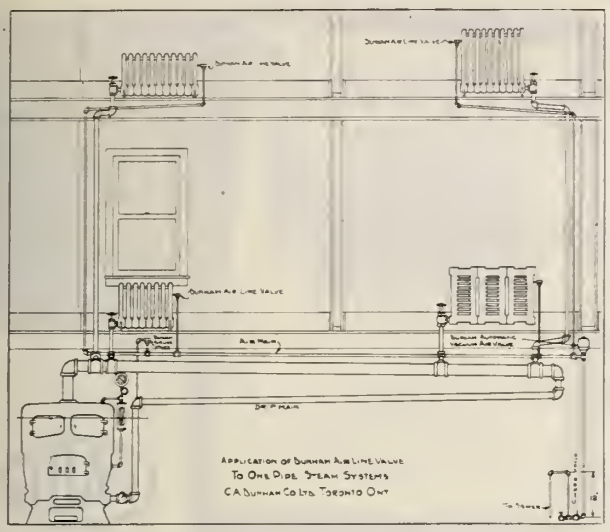

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The old style One-pipe Heating System causes more trouble from air binding than all other troubles put together.

See the cut alongside showing positive and effective means of eliminating those air binding troubles. A DUNHAM AIR LINE VALVE on each radiator passes all air freely. (So that circulation is maintained at a very low pressure.) This valve prohibits any steam from passing into air line, no adjustments to make. The valve adjusts itself to any pressure on the system.

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Make Condensation Yield a Profit

Condenser Trap

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Morehead
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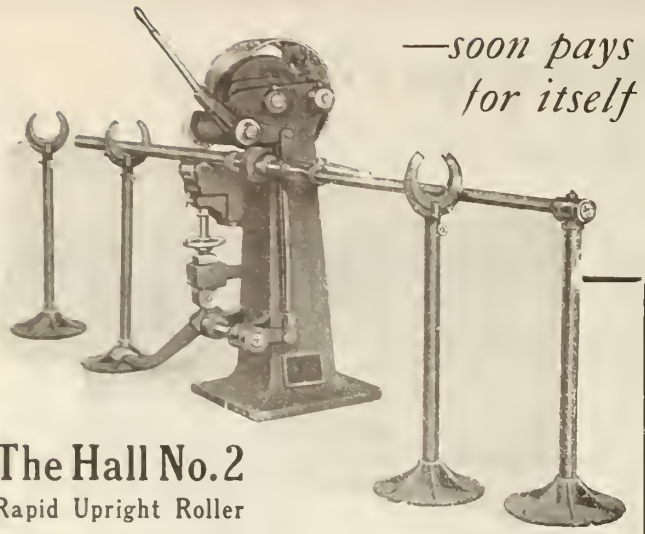
Vacuum Trap

Feed Your Boilers with Pure Water HOT!

Non-Return Trap



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Regular capacity ½ in. to 2 in., with extra cage will take ⅛ to ⅝ in. pipes. Cuts from 400 to 500 pieces of 1 in. pipe per hour.

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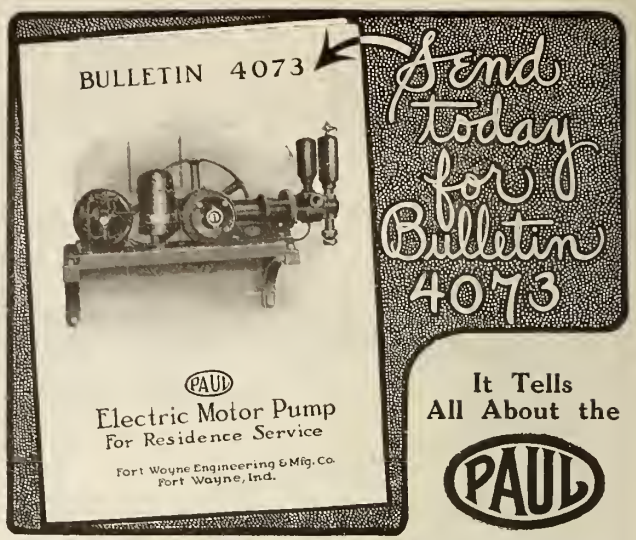
BRANTFORD, CANADA



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Mr. Plumber:—
Here is a perfect, low-priced electric motor pump adapted to all the requirements of the moderate priced home. Easy to install—noiseless—economical. There's money in it for you if you push this pump.

Give us your port of entry and we will quote you a price delivered to that point.

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IT HAS GIVEN SATISFACTION

The chief reason why the Honeywell System of hot water heating is known all over the world is because it has given satisfaction wherever installed. Its wide temperature range and ready response enables it to operate successfully in any climate.

You can install hot water heat for a customer and know in advance that the circulation will be vigorous and that every radiator will reach the proper temperature. The Honeywell System eliminates the uncertainty—IT HEATS.

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PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, SEPTEMBER 1, 1915 No. 17

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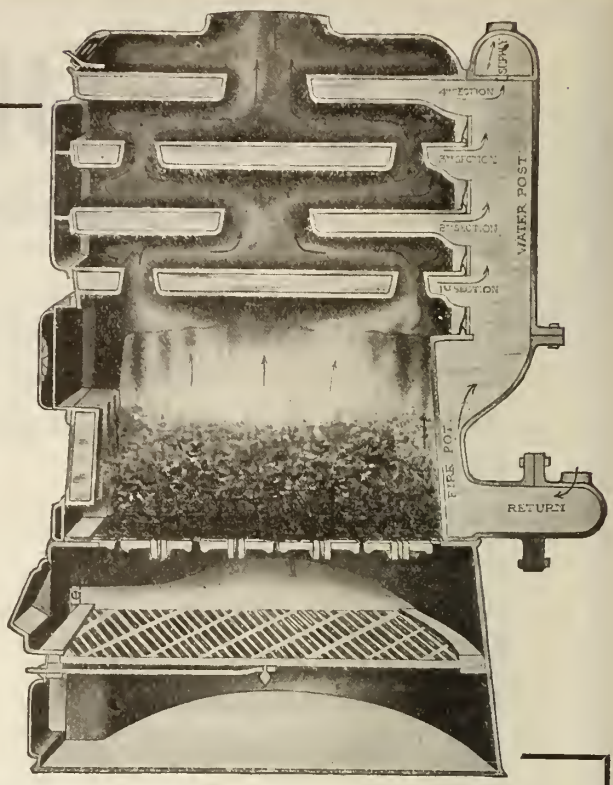

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THE SANITARY ENGINEER

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The Importance of Sanitation

A Medical Scientist Prefers Modern Plumbing and Right Living to So-Called "Pestilence Preventive Poisons," and Challenges the Champion of the Latter—Sanitary Engineers Will Soon Come by Their Own Just Dues.

IN the August 2 issue of The Sanitary Engineer, there appeared an editorial entitled, "Well Ventilated Sewers." The article dealt with a statement which had appeared in a journal published in the interest of the American Medical Association. The publication seemed to infer that plumbing was some mere construction of very minor importance, in fact was a very secondary commodity as compared with the work of the medical professional.

However we find that all medical men do not agree upon this question and that some hold that good may be the final outcome of modern plumbing. The following is a short article which appeared in the August issue of "Physical Culture" and which, short though it is, speaks volumes for the work of the modern sanitary engineer:

THE IMPORTANCE OF SANITATION.

It afforded me great satisfaction to note in a recent edition of Physical Culture, the all-important questions of sanitation, sewerage and disposal of wastes, ably, intelligently and interestingly discussed. The contribution of which I speak was most properly intended for dwellers in small towns, villages and farms, places where the dangers arising from ignorance or neglect of these essential features of our present-day civilization, are unrecognized. This failure to appreciate and adopt such a necessary element of our age, is one of the chief reasons why the average yearly health records of the small towns and villages are so much poorer than that of the larger towns and cities, where the significance of an efficient and modern sanitary and waste disposal system is realized.

At a recent debate held in Brooklyn, on the subject of whether the present crop of serums, antitoxins and vaccines, really have any prophylactic value, **the speaker for the negative challenged the champion of the affirmative, to a unique trial of the efficiency of these safeguards as compared with that of sanitary plumbing and right living.** "I am willing," declared he, "to enter the next epidemic that occurs in any town, with no other precautionary measures, but that I be given quarters **in a house that is supplied with all the features of modern up-to-date plumbing.** Provided," he continued, "that my opponent is also willing to live in this town with no other protection against contagion for himself, but that of the anti-toxin, serum, or vaccine, which he believes gives immunity against the disease prevalent." Needless to say the offer was not accepted.

In direct contrast to the amount of publicity given these so-called "pestilence preventive poisons," and to the halo cast around them, it is seldom or never that one hears of any honors being **awarded to modern plumbing.**

Here we have a medical scientist who is willing to place more faith in modern plumbing and right living than in medicinal remedies. In other words he is a man who favors prevention in preference to cure.

The whole work of the sanitary engineer is built up on this very gospel, the gospel of cleanliness. "Cleanliness is next to Godliness," is an old truth, just as the saying that prevention is better than cure.

Every day's work of the sanitary engineer is a living voice saying unto the people "Be thou clean," whereas the medical profession is in actual existence, because the people have as a whole disobeyed the laws of cleanliness and slighted the work of the modern sanitary engineer.

It is the duty of every sanitary engineer to jealously guard and uphold the reputation of the craft, to clean out the quacks of the profession, and see to it that every member of the craft shall install none but good goods, and first-class workmanship in every detail, and by so doing receive the credit which is justly their due. No profession has done so much for the human race as has that of sanitary engineering. But because of the black sheep in the fold, all have been painted black.

WHY BUCK PROSPERITY?

It's the spineless pessimist who bucks prosperity by sitting back and waiting for things to settle down—he listens to the influence of the calamity howlers' spirit and courts failure.

Imagination usually plays the major part in conditions—identified by "hard times," "business depression," "off seasons," etc., and the penalty as a rule equals the power and vividness of that mental creation. An old saying runs, "imagination is the key to Heaven"; it is also the barometer of a future, registering high or low, according to the mental view point.

Fear closes many a factory and keeps money in the cyclone cellars. Come out soldier-wise and fight in the open, for more than likely you will find the storm passing in another direction. Do not be like the lamb, who at the first foolish noise rushes to cover, or the chicks who scatter before a shower.

The term "convention" too often masks business cowardice, and "watchful waiting" hides fear-shackled decision. Never give your trade, live or prospective, an opportunity to say you "dropped out," it is only a blind for fear or failure. Never give a competitor a chance to say, "one side, please," for if he passes, your prospect for success is considerably lessened.

Nearing the goal, the course grows longer, but a prize bearer never stops for a rising grade, or an opposing tide. Now is your chance to advertise your strength—your optimism, under fire perhaps—and reinforce the common good.—The Business Philosopher.

"Thou Shalt Not" Steal Time

Time is Everybody's Wealth—It Can Only be Used in Two Ways—To One's Credit or Discredit—Our Time Belongs to Someone Else and His Time Belongs to Us—Then Don't Steal His Time and Don't Let Him Steal Yours.

By A. F. Sheldon

In Business Philosopher.

MOSES the mighty arose in his might and said unto all Israel, "**Thou shalt not**" do certain things.

Moses was one of the most efficient efficiency engineers of his time.

Many of his commandments have been embodied into man-made laws and severe penalties attached for the violation of them.

Among the rest of the God-made laws, which Moses harnessed into verbal expression was the one which reads: "THOU SHALT NOT STEAL."

Moses did not specify **Time** as one of the things that we shall not steal.

I wish he had.

Had he included it as well as oxen and asses and things like that, then legislators might have embodied his commandment into the man-made law, thus making it a crime for human asses to steal time.

As it is to-day, if a shop girl is caught stealing a nickel's worth of ribbon she will lose her job and possibly be sent to jail, but she may steal dollars' worth of time and still hold her job, for some time at least, and go scot-free.

The man in the factory, if caught stealing a bucket of coal or any other of the raw material of the factory, will pay the penalty mighty quickly but he may steal ten times the value of the coal or the raw material and get away with it.

As a matter of fact God made many laws which His advance agents like Moses either never spoke or wrote about or else they have been lost in the shuffle of time, translation, etc.

One of them is, "THOU SHALT NOT STEAL TIME."

True there is no man-made law against it.

No one can send you to jail if you do.

But if you do you will violate a natural law and you will pay the penalty.

Tell me, now, did you ever know a gum-chewing-clock-watcher or hold-back-time-thief to climb very high on the ladder of success?

The basic reason why those who steal time do not climb is because they are thieves.

Thieves cannot build the bed rock of Satisfaction and the Confidence foundation necessary for permanent and profitable relationships.

It is true that anyone who steals time is a thief.

Time is money, and therefore he who steals time steals money.

The penalty of the time thief is industrial slavery.

He becomes a galley slave, bound by the chains of impecuniosity, which literally translated means being "hard up."

The time thief does not have to wait to die to go to hell.

It begins to come to him in the here and now.

He suffers the hell of lack of employment and the lack of promotion when he does have a job.

He suffers the hell fire of getting "fired" every little while.

He mistakes the just penalty of the violation of natural law, for "hard luck" and then proceeds to whine about it.

In his ignorance of the law of service he tries to get the heat of reward without building the fire of service, and then bewails his fate as he shivers in the cold of adverse conditions.

Time, time, my boy, and the proper utilization of it, is a necessary element for the building of a good big fire of service.

Your employer has bought your time during working hours.

Every moment of it which you waste or do not utilize to the best possible advantage for him who owns that time is literally stolen.

You are taking something which does not belong to you. You are taking something which has been paid for by somebody else.

You can no more build the fire of service and generate a good big heat of reward without the wise use of your time in the interest of your employer than you can live without nourishment.

Yes, I say it again, steal time if you want to, Moses did not specify it as one of the things "Thou shalt not steal," and there is no man-made law against it, but when you do steal time, do it with your eyes wide open to the fact that you are violating a natural law and must pay the penalty of getting cold.

If unconsciously, you have been a kleptomaniac of time, try this as a remedy:

"LOST! SOMEWHERE BETWEEN SUNRISE AND SUNSET, TWO GOLDEN HOURS, EACH SET WITH SIXTY DIAMOND MINUTES; NO REWARD IS OFFERED FOR THEY ARE GONE FOREVER."

Millions of people are stealing time from their employers and worse than wasting it, who have never even been conscious of their guilt.

Think it over and see if you have been guilty of this crime without knowing it. If so, mentally masticate the above mental morsel, handed down to us by some wise man. Commit it to memory. Say it over and over to yourself every little while. It is a good mental manna.

* * *

At the same time that Moses arose in his might and said, "Thou shalt not steal," he also said, "Thou shalt not kill"; in fact he said that first, and then in the same speech added, "Neither shalt thou steal."

Rightfully he put the crime of killing ahead of the crime of stealing, in order of their importance.

Could he come to us to-day and take a part in modern life, carefully studying the tendency of the times, I believe that he would add another word to each of these injunctions and that among the other commandments which he would give us, as coming from God, Himself, there would be one which would read:

THOU SHALT NOT KILL **TIME.**

All men know it is contrary to man-made law as well as to Divine Law, to kill their fellow men—to murder. To take human life except in self-defence, is a universally recognized crime.

Sometime it will be a recognized crime to kill time. Stealing time and killing time are about the same thing.

Many men have committed self-murder, whose first offence was killing time.

They started in murdering time by seeing, not how **much** but how **little** they could do and still hold their jobs.

By doing this they lost their jobs—then with no recommendation they could not get another—then they scoured on humanity, became criminals and degenerated into the hold-up, the safe cracker or the common house thief.

Driven into a corner in their career of crime men have often shot themselves and have murdered their intended victims of theft.

First they kill time. That was the first link in their chain of killing.

They killed not only time but opportunity and finally ended by killing men, perchance themselves.

Time killers often kill their own fami-

lies by the slow starvation process. Babies are starved to death and worked to death before they are born.

Wives and mothers groaning under burdens, God never intended them to bear, driven to premature graves by overwork and over worry, are the grim and gruesome witnesses of the crime of the time killer.

The man, or the question mark for one who says, "I am earning my salary now and I will be blest if I will do any more" is one of the most polite types of time-thief and time-murderer.

And yet Shakespeare was right when he said, "Our only crime is ignorance."

Such men are ignorant of the basic law of service, which is as follows:

THE INTENSITY OF THE HEAT OF REWARD VARIES DIRECTLY WITH THE VOLUME AND INTENSITY OF THE FIRE OF SERVICE.

Some of the logical effects following the crime of stealing and killing time are that promotion cannot come—a better man gets the job and so it goes; you know the rest.

The time killer succumbs to the law of the Survival of the Fittest and gradually takes his place in the ranks of the unemployed and finally in the still lower rank of the unemployable.

Yes, I know I am speaking plainly on this subject. It deserves plain words.

A lack of understanding of nature's basic principle, the Principle of Service, is accountable for more misery in the world than anything else. It is fraught with far-reaching economic consequences.

Let enough people get busy "tiring themselves out holding themselves back" in the industrial world and employers begin to see that they are not realizing returns on their investment; capital becomes cautious, railroads cease to build, factories cease to create industries, depression comes on, panics ensue and millions suffer, the guiltless with the guilty.

Time killers murder millions whom they never come in contact with.

The greatest evils are those invidious ones which seem harmless.

Let one person murder another and the whole community sets up the hue and cry. The guilty one will be pursued and apprehended if possible, at any cost.

Yet millions of time-murderers ply their deadly trade and no one says anything about it.

Time killed by time killers every day, would, if converted into creative energy, amount to millions in created wealth.

Don't tell me that if this were true "the rich would get richer and the poor poorer."

Don't tell me that the five per cent., the employers of the world, would gobble up all of the increased profit and not increase the reward of the ninety-five per cent.

Don't tell me that it would soon result in a vast "over-production."

I have no sympathy with those who cry "over-production."

The trouble is under-consumption, through lack of capacity to purchase. The "high cost of living" is due to under-production per human unit.

There is no such thing as over-production when millions of people are merely existing and not really living.

The cry of "over-production" is all nonsense while there is one worthy one left who has not enough food, raiment and shelter and then some for the accoutrements of culture.

Don't tell me that employers are generally such a bad selfish lot.

Millions of employers are almost breaking their backs under the burden of proprietorship. These burdens are, in nine cases out of ten, due to the tactics of the time killer.

Don't tell me that they would not increase wages and be glad to do it if everybody would get busy and do his best.

There would then be something besides deficits and borrowed money out of which to pay wages.

Millions of employees are at their jobs just to see "how much they can get out of it" instead of to see "how much they can put into it."

The result is that there is not enough in the business, which is furnishing them the job, to enable the owner of the business to take much out with which to pay big wages.

Go to the bee, thou time killer, study his ways and be wise.

The workers and honey makers in a real beehive have no use for the drones. They kill them off.

If you must kill something, kill the drones, don't kill time for by killing time you yourself become a drone and are deserving of financial death.

An employee in a department store was once standing with his hands in his pockets doing nothing but nothing.

A fellow employee came up to him and said to him, "Take your hands out of my pockets."

The time killer got angry and said, "Mind your own business, I have not got my hands in your pockets."

Whereupon the honey maker answered and said unto the drone, "You are stealing the time of the man I am working for. You are taking the time he has paid you for and idling it away. By doing this you subtract from the profit making power of this business. By subtracting from the power of the business to pay the rest of us, who are doing the best we can, you are literally taking money out of my own pocket and the pockets of your fellow employees; when you kill time standing there with your hands in your pockets doing nothing—when there are plenty of things you could find to do if you were working for this store instead of in it."

Granted, the circumstances of a business beehive employing 100 people. Granted that even ninety per cent. of the employees are rendering faithful service.

Thus do we see the far-reaching evil consequences of the time killer.

Don't kill him literally. Don't commit murder. But unless he mends his ways ostracize him. If you don't know what that means look it up in the dictionary.

Yes, yes, John, my dear fellow, I know full well that there are two sides to this great question.

I know there are employers who in some previous incarnation possibly not remotely removed, undoubtedly belonged to the hog family.

There are still types of the human hog but let me tell you this. He cannot long survive. There are not many of him left. His tribe is rapidly decreasing.

What's more, if I was working for a human hog and he wanted to get great service from me without giving in return I would then build the biggest fire of service possible. I would literally make it hot for him.

Doing so, I know full well that one of two things would be bound to happen to me.

My employer would either become ashamed of himself and begin to distribute the heat of reward or else some worthy employer would find me out.

You cannot hide the light generated by the fire of faithful service under the bushel of any one business.

Let your light (of service) so shine that it shall be seen among men.

If in my prelude of the telling I have seemed harsh upon the time killer and time thief, if perchance you, reader, had unconsciously been one, then remember the wisdom of Shakespeare when he said that we must sometimes be cruel to be kind.

If perchance my words have been very plain, remember it is not that I love the employer or the employee less but truth more and humanity more; and employers and employees are a large part of humanity.

I know that the interests of each are mutual, and may God speed the day when all see it so.

Seeing it so, and the truth of it is self-evident when once made plain, the only sensible thing left for each of us to do is to try it.

And "the way to resume is to resume."

An unwritten law of God has been thundering through the ages since man was made, which if put in writing, would read: "THOU SHALT NOT KILL TIME, NEITHER SHALT THOU STEAL TIME."

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

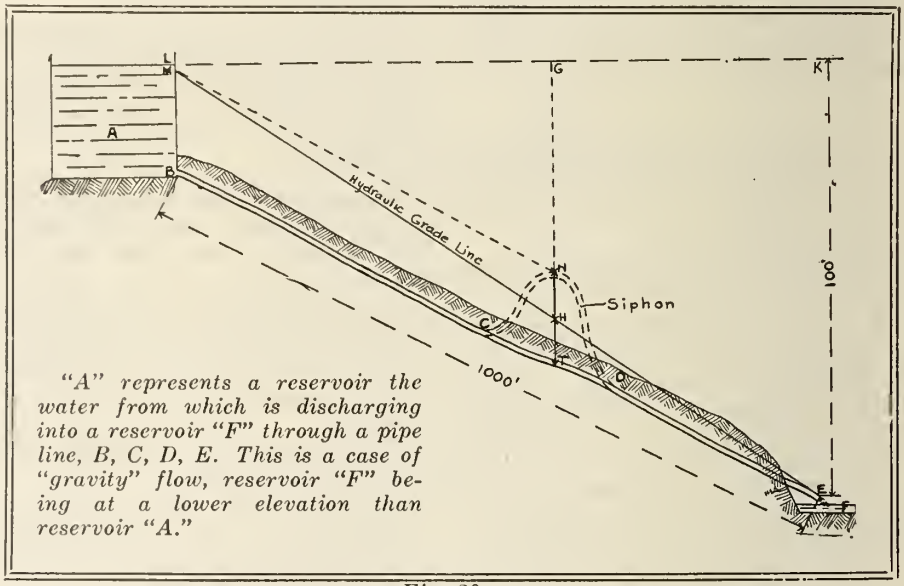
Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 11.

REFERRING again to Fig. 20 the line ME termed the Hydraulic Grade Line will be noted. The position of this line could be practically determined by noting the heights water during flow would rise in vertical pipes inserted at various points in the pipe BCDE. For example if GT is taken as such a vertical pipe then the water would rise to H and the height of water HT represents the pressure in pipe at T. For a pipe of constant diameter throughout and with no sharp bends the hydraulic grade line is found to be practically a straight line. The pressure at B at entrance to pipe is equal to the head of water BL less the small head LM due to friction loss at entrance. At E since the water is flowing freely into the air there is no pressure at all in the pipe. By joining with a straight line point M to point E the hydraulic grade line is determined and in general by similarly plotting the hydraulic grade line one can measure from the plot at any point the head and consequently the pressure ($p = 434\ h$) in a pipe which might for example dip down into a valley. Such information is necessary to make sure that the pipe is sufficiently strong to stand such extra pressure. It is as important, however, to, if possible, avoid laying the pipe above the hydraulic grade line as CND in the figure. This may, however, be necessary to avoid expensive excavation through a hill. If the distance NH is less than about 34 feet (head of water corresponding to atmospheric pressure) the pipe CND will act as a siphon and the water will still flow as freely as ever if no air collects. However it is practically impossible to keep the siphon air-tight or air from collecting and eventually the siphon is broken. Then as in the case when the distance NH is more than 34 feet the pipe BCN will only be under the reduced head GN and pipe NDE will only flow partly full and the flow at E will therefore be reduced. The dotted line MN gives the hydraulic grade line for such conditions and it follows pipe NDE for the rest of the way since there can be no pressure in a pipe flowing partly full.

The size and material for house service pipes are determined by by-law or custom (stock sizes) and ½ or ¾ pipes are generally used. Where the pressure is over 20 pounds per square inch some houses of five or six rooms are for economy frequently supplied entirely through ½ inch pipe. It is not usually necessary therefore for the engineer to calculate the pressure or discharge from a pipe in a building as in Fig. 22 it could be done in the same way as already described in a previous article.

If the pressure in the main is 60 pounds per square inch then a stand pipe (shown dotted in figure) 138 feet high would give the same pressure. If the end of the pipe is 30 feet above the main then the head is 108 feet. Allowance for friction at entrance and at bends should be made, about once the velocity head for loss at entrance to pipe at main and about twice that amount for each sharp right-angled bend. Tables prepared by the Thomson Meter Co., contain information from which the following Table VII has been prepared.



"A" represents a reservoir the water from which is discharging into a reservoir "F" through a pipe line, B, C, D, E. This is a case of "gravity" flow, reservoir "F" being at a lower elevation than reservoir "A."

Fig. 20.

TABLE VII.

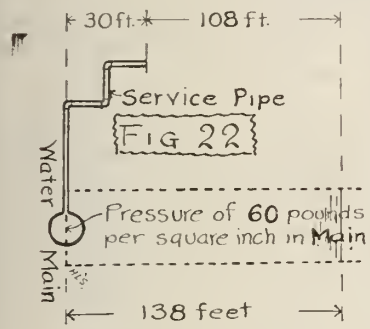
Discharge through 100 feet of Lead or Iron service pipe.

Nominal Diameter in Inches	Pressure in Main pounds per sq. in.	Vertical Rise in feet	Discharge in cubic feet per minute
½	30	0	0.66
		15	0.55
		30	0.44
	60	0	0.94
		15	0.83
		30	0.73
¾	30	0	1.84
		15	1.52
		30	1.22
	60	0	2.60
		15	2.29
		30	2.02

To find gallons per minute multiply the discharge in cubic feet per minute by 6¼.

For the case shown in Fig. 22 if a ½ inch service pipe is used the discharge is 0.73 cubic feet per minute or 4.56 gallons per minute—if a ¾ inch pipe, 12.62 gallons per minute (2.02 cubic feet per minute).

The sanitary engineer should be familiar with the hydraulic principles stated in the following briefly discussed cases.



Measurement of Stream Flow by Weir.

When the most convenient source of water supply is a small stream the engineer may wish to know if there is sufficient flow of water for his purposes. Fig. 23 illustrates how a board with a rectangular notch termed a weir can be placed across the stream. By measuring the head of water above the weir the flow may be determined. The notch should be about 2-3 the width of the stream and deep enough to take all the water. It should be bevelled so that only the inner edges are touched by the water and the bottom of the notch should be about one foot above the original level of the stream so that there will be a clear fall over the weir. Take the case of a stream 6 feet wide and 1 foot in the deepest part. A board 8 feet long and 3 feet wide placed across

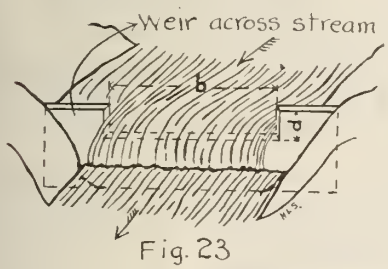


Fig. 23

the stream with a notch 4 feet wide and 1 foot in depth would probably be about the size required. The only measurement necessary would be to determine the head of water above the bottom of the notch.

This is usually done by driving a stake about 6 feet upstream from the weir and on a level with the bottom of the notch. The water thus far above the weir is undisturbed and the height of water (H) above the stake can then be carefully measured by means of a rod. From the formula $Q=3.33 \times (b-.2H) \times H3\text{-}2$, (determined by experiments),

where Q=cubic feet per sec.
b =width of weir in feet.
H=head of water above weir in feet.

the amount of flow can be determined. For the case mentioned if H should be found to be 6 inches, then from tables based on the above formula the flow of the stream is found to be about 1710 gallons per minute.

To determine the quantity of water discharged from a pump a weir box can be made. The water pumped into the box escape over the weir, the head of water on which can be measured and the flow determined as in the case of a stream. (See Fig. 25).

The Hydraulic Ram.

Where a gravity supply of water cannot be obtained, the engineer may find

the hydraulic ram the most economical means of raising water to a higher level. The conditions necessary are a small stream or other source of supply so situated that a small fall can be obtained. Part of the water can then be lifted by the ram to a considerable elevation. Small rams are listed at nine dollars; repairs are the only other expense as no other power is needed.

Fig. 24 is a diagram of a hydraulic ram, which consists of a waste valve A and an air chamber with a valve B. The valve at A is so weighted or controlled by a spring that water in the drive pipe will at first escape at waste valve A. This starts a flow in the drive pipe which closes the valve, when properly adjusted, at A, for it can be proved that (neglecting friction) the pressure exerted by flowing water is twice that of water at rest and under the same head that causes the flow. The momentum gained by the flowing water drives some of the water into the air chamber compressing the air and possibly driving some water up the discharge pipe. As the pressure increases in the air chamber the flow is diminished and valve B closes. This causes a reduction of pressure in the drive pipe and valve A opens, the compressed air in the air chamber in the meantime expanding and sending water up the discharge pipe. This operation is repeated a number of times per minute and there may be as many as 200

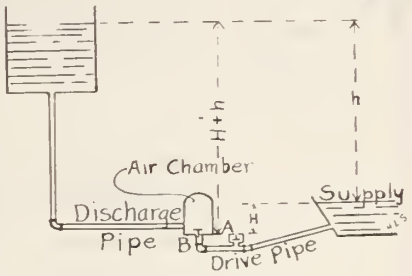


Fig. 24

strokes of the ram per minute. The longer the stroke the more water is required to operate.

The momentum gained in the drive pipe is the energy utilized and the longer this pipe the more work the machine will do. The usual length of drive pipe is from 25 to 50 feet, 15 feet being the shortest length that will allow for sufficient momentum of the flowing water. The least head that will operate the ram is 1½ feet, but at least 5 feet should be had if possible. In general, as the fall in the drive pipe is increased then both the amount of drive water necessary and the size of the ram can be decreased in raising a certain amount of water.

For a small ram the drive pipe is ¾ inch and the discharge pipe ⅜ inch and as a rule the discharge pipe is ⅛ the diameter of the drive pipe. With a long

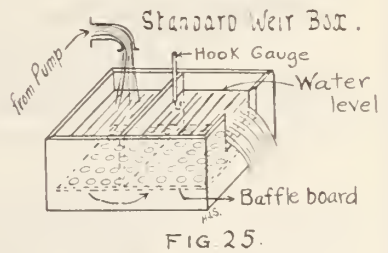


FIG 25.

Depth of weir should not be over one-third depth of box and distance from side of weir to the side of the box should not be less than the depth of weir.

discharge pipe the diameter can be made larger to allow for friction.

In operating the ram a very large proportion of the water must escape from the waste valve. If Q represents the amount of water delivered to ram and q the amount raised through the discharge pipe then theoretically: $q(H+h) = Q\,H$ (see Fig. 24). If H is

(Continued on page 18.)

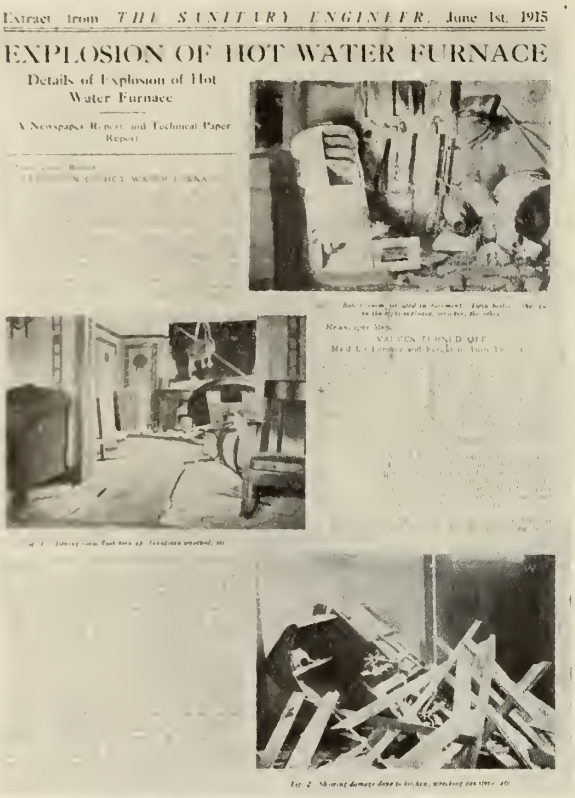
Getting After New Business

Sanitary and Heating Engineers in Large Towns and Cities are "Seeking" and "Finding" Business—Becoming Better Salesmen Every Day—Quite a Large Number are Realizing an Improvement in Their Business.

Seventh Article of this Series.

WHEN any member of the craft, or company engaged in the sanitary and heating engineering business, adopts up-to-date methods of doing business, they are not only increasing the efficiency of their own business, but they also reflect credit upon the whole trade. They put new life into the business methods of the whole craft, and in many ways create a better feeling between members of the craft and the public. There are men in the trade to-day who have imposed upon themselves the responsibility of raising the standard of the craft in many ways, and the craft cannot fail to benefit by their actions.

Messrs. Mashinter & Co., Toronto, are doing great things in the advertising line. They are bringing their concern before the eyes of the public in many ways, and are reaping the benefit. Mr. Mashinter told the writer a few days ago that as a result of sending out one of the cards, a facsimile of which is shown below, they increased the number of their customers by 57 in a very short time. Our readers will note that the main feature


Extract from *THE SANITARY ENGINEER*, June 1st, 1915

EXPLOSION OF HOT WATER FURNACE

Details of Explosion of Hot Water Furnace

A Newspaper Report and Technical Paper Report

"YOUR NEAREST PLUMBER"

MASHINTER & CO.

59 NELSON STREET

TELEPHONES, Office - ADELAIDE 366 Nights, Sundays and Holidays, JUNCTION 5956

Fig. 3.

put forth by this progressive firm is that of service. Service first, last and always, is their motto, as it should be the motto of every person engaged in this profession.

Getting after new business by advertising is the highway to success. If one is to build for the future, the foundation must be based upon service.

Instead of trying to get the most money by putting forth the least effort, it should be just the reverse. Men who will achieve success from now on will be those who say: "How much service can I give for a certain sum of money?" And finally having decided, see that the maximum of service is rendered. On the other hand, the sanitary engineer who is content to go on in the same slipshod way will very soon be forgotten.

If any of our readers were to ask the manufacturers of Dutch cleanser, Quaker's oats, or Kellogg's corn flakes on what they base their success, they would reply that it was service and sound advertising.

The very same arguments hold good with sanitary and heating engineers.

Sound advertising and service will do wonders if applied to this line.

In the first place, your advertisement must be a statement which is true. It must tell the public that you are in business to be of service to them. It must give out some valuable information and inform the public that your services are on tap 24 hours a day.

Pipes don't wait until the hours of from 7 a.m. to 5 p.m. before they burst. Furnaces don't get out of order at convenient hours. Then why not advertise a night and day service? The public are becoming more favorably impressed with the sanitary and heating engineers than ever before in the history of the craft, and it is largely as a result of the new methods adopted by concerns of the type of Mashinter & Co., Toronto. This progressive company reads **The Sanitary Engineer**, and has just recently based a whole advertising campaign upon an article which appeared in the June 1st issue, which related the

Have You a Circulation or Overflow Pipe on Your Heating System?

PHONE ADELAIDE 366

AND WE WILL SEND A COMPETENT MAN TO THOROUGHLY EXAMINE YOUR HEATING SYSTEM —FREE OF ALL CHARGE.

WE HAVE HAD OVER 25 YEARS' EXPERIENCE IN PLUMBING AND HEATING

Have Your Man Call at — *Mashinter & Co.* NELSON STREET TORONTO

Fig. 2.

story of the hot water boiler explosion caused by a defective installation. A small reproduction is shown herewith. The other illustrations are Fig. 1, that of a blotter. The first leaf or cover printed on heavy-coated stock cardboard, and stitched to it are three pieces of good quality blotting paper. Fig. 2 is simply a stout card. Fig. 3 is a stout card with a hole in the top.

YOUR NEAREST PLUMBER

MASHINTER & CO.

59 NELSON ST.

SERVICE DAY OR NIGHT

PHONES: DAY-ADEL-366 NIGHT JUNC-5956

Fig. 1.

Facsimile of blotter, original size 9x4 inches, with three leaves of blotting paper stitched on underside.

A Business Decalogue

By GRAHAM HOOD

I. Thou shalt not wait for something to turn up, but shalt pull off thy coat and go to work that thou mayest prosper in thy affairs.

II. Thou shalt not be content to go about thy business looking like a loafer, for thou shouldst know that thy personal appearance is better than a letter of recommendation.

III. Thou shalt not try to make excuses, nor shalt thou say to those who chide thee, "I didn't think."

IV. Thou shalt not wait to be told what thou shalt do, nor in what manner thou shalt do it, for thus may thy day be long in the job which fortune hath given thee.

V. Thou shalt not fail to maintain thine own integrity, nor shalt thou be guilty of anything that will lessen the good respect for thyself.

VI. Thou shalt not covet the other fellow's job, nor his salary, nor the position that he hath gained by his own hard labor.

VII. Thou shalt not fail to live within thy income, nor shalt thou contract any debts when thou canst not see the way clear to pay them.

VIII. Thou shalt not be afraid to blow thine own horn, for he who so faileth to blow his own horn at the proper occasion findeth nobody standing ready to blow it for him.

IX. Thou shalt not hesitate to say "No" when thou meanest "No," nor shalt thou fail to remember that there are times when it is unsafe to bind thyself to hasty judgment.

X. Thou shalt give every man a square deal. This is the last great commandment, and there is no other like unto it. Upon this commandment hang all the law and profits of the business world.

From T.U.E.C. Special No. 32

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SEPTEMBER 1, 1915

THE DAY OF STANDARDIZATION.

IN almost all lines there is to-day a tendency towards standardizing everything. In the West the standardization of soil pipe and fittings has made great strides much to the credit of the members of the Canadian Institute of Sanitary Engineers.

Long ago a fixed standard was adopted for pipe threads though threaded pipe fittings are not all standard as regards size or rather radius. Some elbows have a greater radius than others, as also have the branches of tees.

Another commodity that could well be made of a standard size, thereby becoming of greater use, is that of the catalogues distributed to the trade.

With this aim in view The Sanitary Engineer will be only too pleased to bring this matter to the notice of both manufacturers, jobbers and the sanitary and heating engineering craft.

What looks more unbusinesslike than an untidy bookshelf, or a drawer full of catalogues and price lists yet what could be of more use if standardized?

At present it is almost an impossibility to keep catalogues and price lists in such order as to enable the owner to refer to them with ease. This state of affairs greatly depreciates the value of such books. Every progressive, or would-be progressive sanitary and heating engineer must be the possessor of a goodly assortment of catalogues, they are his business reference library. They should be kept in such order that they can be easily referred to at will, not after long wading through a conglomeration of printers' ink.

The Sanitary Engineer is of the opinion that if the craft were to demand uniformity in size of all reference literature, whether price-lists, catalogues or folders, the manufacturers would give some consideration to the matter. Any of our readers who care to express themselves on this matter may do so freely through the pages of this journal.

We feel that the more orderly a bookshelf is kept the more easily its contents can be referred to. Such being the case all catalogues and the like would become more appreciated if uniform in size.

EXHIBITION WEEK.

THE National Exhibition is now in full swing at Toronto. Several weeks ago we were informed that all available space had been taken up by exhibitors in all lines. Shell manufacturing will be demonstrated and quite a number of lines hitherto never made in Canada to any great extent. This is very commendable, it goes to show that Canadian manufacturers, when put to it, can manufacture almost any line equal to manufacturers in other countries. It now behooves every Canadian citizen to investigate these home products in as unbiased a way as possible, and to do all in their power to encourage home industries.

To see for one's self what Canadian manufacturers are doing is to visit some exhibition, and none is more popular than the one held in Toronto every year.

In spite of the fact that we are waging one of the most sanguinary wars in the world's history, we are also waging an industrial war. We are showing the world that what we cannot import, we can make ourselves.

It will be seen that the sanitary and heating trade is by no means forgotten. Manufacturers of plumbing and heating supplies are represented in no small degree, and those of our readers who can see their way clear to pay a visit to Toronto during the next two weeks will be surprised at the splendid way in which manufacturers have turned out to greet those with whom they do hope to do business in the future.

No trade has kept up better than the sanitary

and heating trade despite adverse conditions, and no line of business received such a halt as did the building trade, which without doubt is the trade barometer.

BUSINESS OUTLOOK BRIGHTER.

ALL business men are naturally keeping a close watch on harvesting operations. An optimistic spirit prevails in business circles with regard to this season's crop, very favorable reports continue to be sent out from various points in the West and a large yield is expected. On this account the general outlook is favorable, and in conjunction with the war business industrial conditions are better than at any time since the outbreak of the war. The extent to which canada is benefiting by war orders is shown in an official statement recently issued by the Department of Trade and Commerce. The British Government alone has placed orders to the value of $230,000,000 with Canadian manufacturers for equipment already made or in process of manufacture. Of this sum $188,183,180 represents the expenditure on munitions. In addition are contracts placed by the other Allies, the particulars of which have not been published, but will in the aggregate amount to a considerable sum.

Such being the case there is no reason why the sanitary and heating business should not benefit somewhat. Of course it requires some considerable amount of work on the part of sanitary engineers to get business going, because the public as a whole are holding tight to what surplus money they have. Plumbing and heating installations as a rule are left to the last moment before they are overhauled. The cold weather will soon be upon us, and if a little persistency on the part of the craft can get some of the overhauling done before the time for lighting up furnaces arrives, customers will appreciate the interest taken in their behalf. It is a well-known fact that as cold weather comes round there is always a rush to get repairs done, many of which could be done more thoroughly, if executed a little ahead of stoking-up time.

THE SALESMAN'S IDEAL

I WANT my Selling Talk to be a Service Talk—one that will be worth others' time whether they buy my goods or not.

I want it to tell only the truth, and that as fully as may be.

To be a perfectly human statement easily understood by others.

To show simply and plainly how both I and my goods can serve.

To contain Wit only as that conforms to Wisdom.

To be presented in full view of the fact that every man's time is his property—only to be secured by honest methods.

To result from personal self-persuasion, as I would wish to persuade others.

To prove of such real value to patrons that my goods shall be always to the fore rather than myself.

To so demonstrate the Merits of my goods and service, that others will crave them when in need of either.

This is my ideal.

—Selected.

BUSINESS LOYALTY

Should you wish to be successful
From a business point of view,
To infuse a brighter outlook
On those days of sombre hue.
Put a stop-cock on your troubles,
This world has woes to burn,
Just grin, and keep on plugging
Till the wheel of furtune turn.

If you wish to wear the laurels
Of a winner in the fight,
You must never knock your home town
But boost with all your might.
Do your share of advertising
In an optimistic strain.
Don't be a hard-times croaker,
Be a man, and play the game.

In the present battle deluge
We honor our heroes who fight
In the scathing flame of the front line
For Liberty, Justice and Right.
But back at the loom and the workshop
Heroes must tirelessly spin;
And the man who succeeds in business
Is helping his country to win.

—Eva E. Hamilton.

Personality in products produces profits. Don't build merely for price alone

Analysis of Canadian Plumbing Bylaws

Proposed New Plumbing By-law for Montreal—Many Clauses Not Only Ridiculous, But Impracticable, Proving That Sanitary Engineers Should be Consulted in Such Matters—The Sanitary Engineer Takes Full Responsibility for the Criticism Published in This Series of Articles.

THE first of this series of articles appeared in Aug. 16th, issue and will be continued in each issue until finished.

The by-law is one of over 150 clauses, of which as we pointed out in our last issue, a considerable number serve no practical purpose whatever.

The three following clauses might have been embodied in other clauses:

STANDARD PIPES.

Scetion 593.—Wherever extra heavy cast iron pipe is not hereby required, standard cast iron pipe or galvanized wrought iron pipe may be used.

CAULKED JOINTS.

Section 594.—All joints on cast iron pipes and fittings shall be made with oakum and lead, properly caulked.

WIPED JOINTS.

Section 595.—All joints in lead pipe work shall be wiped joints.

The following clauses need no comment as they are general, and are found in almost every plumbing by-law, with the one exception that in sections 597 and 599 there is no mention made of oakum being used. No joint of the kind mentioned should be made without oakum. Oakum prevents either the molten metal, or fluid cement from running through the pipes where they come together and should never be omitted under any circumstances.

CONNECTION BETWEEN LEAD PIPE AND WROUGHT IRON PIPE.

Section 596.—All connections between lead pipe and wrought iron pipe shall be by means of brass fittings having wiped joints connecting the lead piping thereto.

JOINTS IN VITRIFIED PIPES.

Section 597.—The joints of vitrified pipes shall be made of pure Portland cement, or of cement mortar composed of one (1) part of cement to not more than one (1) part of sand, and each joint when laid must be properly cleaned out with a circular scraper to remove roughness and obstructions, before the succeeding joint is made.

JOINTS IN WROUGHT IRON PIPES.

Section 598.—All joints in wrought iron pipe work shall be screwed.

JOINTS BETWEEN CAST IRON AND VITRIFIED PIPE.

Section 599.—Joints between cast iron pipe and vitrified pipe shall be made with Portland cement.

JOINTS BETWEEN CAST IRON AND WROUGHT IRON PIPE.

Scetion 600.—Joints between cast iron pipe and wrought iron pipe, shall be made by forming a spigot on the wrought iron pipe and caulking with lead in a manner similar to that for cast iron joints.

Here is a clause which is not practical, at least it is out of the ordinary. To follow it out one would have to get a cast iron hub and caulk the wrought iron end into it, such a clause excludes the use of cast iron screwed vent tees, or screwed increasers.

We feel sure that it was simply a case of ignorance on the part of the compilers, proving that they were not conversant with the most up-to-date practice.

The screwed tee and increasers are about the handiest and best fitting to use when making a joint between cast iron and wrought iron.

JOINTS BETWEEN LEAD PIPE AND CAST IRON PIPE.

Section 601.—Joints between lead pipe and cast iron pipe shall be made by joining a brass spigot to the lead pipe by means of a wiped joint and proceeding as for cast iron caulked joints.

JOINTS TO BE GAS-TIGHT AND WATER TIGHT.

Section 602.—All joints shall be gast-tight and water-tight under pressure of twenty (20) pounds per square inch.

Section 602 is another case where a practical man would have been of use. This section refers to the tests which sanitary piping and construction must be subjected to. We have no objection to 20 lbs. pressure being put on all such work, but how are the joints to be tested so as to prove they are "gastight" and "water-tight?"

There is not sufficient information given by any means.

If the gas test is to be put on how is the test to be applied? The same with the water-test. General practice is that every stack or shall we say all "roughing in" for plumbing fixtures shall be water tested by plugging the stack, either at the extreme end of the pipe line where the sewer connection is made, and filling it with water to the top of the roof. Though in some cities various sections of, say, 50 feet are tested separately where the soil pipe stack is several hundred feet in height.

This section demands a 20 lbs. test on every joint, which would be an utter impossibility if the regular method of water testing is followed out.

For instance if the stack is filled up to the top and is, say, 75 feet in height one part would be tested to about 32½ lbs. down to ½ lb. Thus proving that a 20 lb. uniform test could not be made unless some specific method of testing be adopted.

The gas test would not be as troublesome, but even this test should be defined more clearly.

We are not aware that any other than the regular practices of testing by water and smoke are adopted in Montreal.

SEPARATE SEWER CONNECTIONS.

Section 603.—Every property shall be separately and independently connected with the street sewer.

COMMON SEWER CONNECTIONS FOR SEVERAL BUILDINGS.

Section 604.—In cases where there are two (2) or more buildings on the same lot, and the area of the lot does not exceed three thousand (3,000) square feet, one (1) sewer connection may serve the lot.

Here are two sections which could easily have been embodied in one section.

The latter section we do not agree with. Without doubt every building should have its own separate sewer connection, at least up to the street line. It may in very isolated cases, be advisable to place a branch at the building line so as to do away with breaking up the street when a new branch is required, in which cases these branches should be made at not less than a 45 degree angle. The branches should then in all cases be carried to the ground level and a cleanout placed on it, so that in case of chokage, it could be easily cleaned out by the use of some kind of rod. It is quite a common thing to see beautiful

gardens and lawns cut up on account of there being no provisions made to clean out a choked drain, and in nine cases out of ten these are party drains, used by the occupants of more than one building, therefore it can be plainly seen that a separate drain connection to each building is preferable.

DRAIN CONNECTIONS FROM SEWER.

Section 605.—The drain connection from the sewer to within three feet (3) of the front wall of the building shall be made of vitrified pipe or extra heavy cast iron pipe or galvanized wrought iron pipe.

Comment upon this section simply devolves into a matter of giving one's opinion as to what material is best, and which has been proved best in actual practice.

This portion of drain is seldom if ever installed by the domestic sanitary engineer. It is generally installed by the city engineering department.

It will be noted that galvanized iron may be used. With this we do not agree. Galvanized iron should never be used as drain pipe if the pipes are underground. Fort William found that galvanized pipe rusted at the points where the pipe is cut, and every sanitary engineer who has had any practical experience can vouch for this statement.

Further, if galvanized pipes and fittings are used at all, every bend or offset should be made with a plugged opening to be used as a cleanout. Experience has proved that cast iron is the very best material for such purposes and we strongly oppose the use of galvanized pipe for the purpose named in section 605.

DRAIN CONNECTIONS TO BUILDINGS.

Section 606.—The drain connections from a point three feet (3) outside of exterior face of the front wall of a building shall be made of extra heavy cast-iron pipe. In the case of frame buildings where the distance from the top fixture to the lowest point of the sewer does not exceed twenty feet (20) and where the sewer is not underground, standard cast-iron pipe may be used.

The above section really bears upon five subjects. That of drain pipes that are underground and drain pipes that are not underground and could have been made much clearer by stating "all cast-iron drain pipes buried underground shall be extra heavy and treated with a coating of asphaltum." Cast-iron soil pipes not underground shall be "medium" and in conformity with tables and weights given in section so and so. The first portion of section 22 in the old by-law, number 318, is much clearer and reads as follows: Sec. 22.—"Interior house drains, when above ground, shall be of cast-iron. When laid underground, the drains shall be of very heavy cast-iron or vitrified clay pipe, and shall have a fall of at least ¼ inch to the foot."

PIPE LINES TO BE OF THE SAME CONSTRUCTION THROUGHOUT.

Section 607.—All pipes shall be of the same class of material throughout.

This section is altogether out of place if other sections are to be followed out, simply because there is mention made as to how wrought iron and cast-iron joints shall be made. Of course, we know what is meant to some extent. But what should be stated is "that no line of soil, waste, or drain pipe shall be made up of more than one kind of material, but that if cast-iron is started off with, the whole line shall be cast-iron throughout and not be continued with wrought iron or vitrified clay pipe intersections."

VITRIFIED PIPE DRAINS.

Section 608.—It is forbidden to construct a vitrified pipe drain within one foot (1) of a building line or within two feet (2) of any foundation wall.

This section is really covered by sections 605 and 606, when it is demanded in section 605 that "the drain connection from the sewer to within 3 feet of the building, etc." Or in 606 where it says "The drain connection from a point three feet (3) of the front of the wall, etc." This section is therefore redundant.

The following three sections are all embodied in most plumbing by-laws and are general.

BASEMENTS WITH DRAINAGE BELOW SEWER LEVEL.

Section 609.—Basements having drainage below the sewer level shall have the drainage pumped up into the sewer through connections in conformity with this by-law.

FALL OF SEWER CONNECTIONS TOWARDS SEWER.

Section 610.—All sewer connections shall have a continuous fall towards the sewer of at least one quarter of an inch (¼) per foot.

SEWER CONNECTION RUNNING INTO CELLAR.

Section 611. — Where practicable, sewer connections running into a cellar shall run along the wall of the building. If this be not practicable, the pipes shall be hung on iron hangers securely fastened to the floor joists or in a trench out to a uniform grade.

TRAPS FOR SEWER CONNECTIONS.

Section 612.—Every sewer connection shall have a trap placed at, or near the line of the sidewalk curb.

AIR INLETS TO HOUSE DRAINS.

Section 613.—Every house drain shall have a fresh air inlet of not less than four-inch (4) pipe, with perforations of sixteen (16) square inches or more.

The inlet shall be connected to the house side of the trap and led to the outer air terminating at a point not less than ten feet (10) from any door or window.

FRESH AIR INLET TO MAIN TRAPS.

Section 614.—The main trap at the sidewalk shall have its fresh air inlet so constructed as to freely admit a supply of the outer air and at the same time offer adequate protection against the introduction of foreign matter into the trap.

Referring to section 612, this is, to put it mildly, ridiculous. It demands what is known to the trade as "the main house trap."

But it is worse. Just imagine any practical man demanding that "the main house trap shall be placed at or near the line of the sidewalk curb."

Every practical man, even though he be one of the old conservative stock, knows very well that the main house trap should be placed in a place easy of access. **The Sanitary Engineer**, however, does not agree that there is any necessity for such trap to be inserted in the main house drain.

One inspector of sanitary engineering construction, and a practical man at that, when asked his opinion of the main house trap, referred to the matter as follows:—"No trap should be permitted between the house drain and public sewer, unless otherwise decided by the chief plumbing inspector, in which case such trap shall have a hand hole for cleaning purposes and a fresh air inlet pipe, the whole as may be decided by the department. All fresh air inlets are dangerous, and a continual menace to children and all people who sit outside their doors in summer. The top of the main trap is left loose nine times out of ten, and consequently is often lost eventually, causing drain to be wide open. It is also dangerous to the public passing by.

"In a certain city there exist three or four buildings which have them. When I was sanitary inspector I was called up to locate a very bad smell in the reception room of a college, the occupants of which could not explain. When entering the room I detected a pronounced smell of sewer gas. After explanations from the lady in charge, I walked over to the open windows and, on looking out, I saw one of those fresh air inlets, and the odor coming therefrom was something abominable. The

said trap and the fresh air inlets were removed and the nuisance ceased. The reasons for their installation are insignificant compared with the reasons for their abolition."

Both the main house trap and breather are an impractical commodity, and should not be allowed in these days of progress.

It will be seen from this inspector's remarks that the main house trap and breather are things of the past, and their use should certainly not be embodied in any up-to-date plumbing by-law.

The two sections 613 and 614 would lead one to think that there should be two breathers—one for the trap situated at the sidewalk, and another about ten feet from a window. Of course, it may be inferred that if the sidewalk is within ten feet of a window the same breather will suffice, but in the City of Montreal there are thousands of cases where it would be impossible to install a breather so far as ten feet from any door or window, unless it was installed several feet on the street. This last section (614) is by no means practical. As it happens, there is just such a clause embodied in the City of Toronto by-law, and what is the result? In four cases out of five these breathers are projecting a few feet from the door, under verandahs or through the lower portion of a store window and overhanging the sidewalk.

(Continued in next issue.)

SOME MORE DON'TS.

By John Wright, Toronto.

Don't forget there is a jewel in every pile of rubbish, may it be ever so small. So you must believe there is about your competitor some place he has a jewel you can use.

Don't forget that the Sanitary and Heating Engineer is more of a necessity than the carpenter or any other craftsman. The city dweller cannot do without him.

Don't forget that 90 per cent. of your customers want you to make a profit.

Don't forget that it is your own fault if you don't make money.

Don't forget that you always have enough friends that are willing to pay you a profit: why shouldn't the man who runs to all the shops pay his profit?

The above list of Don'ts are mighty valuable for our trade as a whole, and if they were generally practised, we would be able to do far greater things for our fellow-citizens than we can now. When you think of the vast amount of money which is invested in the production of plumbing and heating materials, and the important part which sanitary and heating systems play in our every-day life, can you help but say to yourself, "Am I getting my share, and if not, why not?" Think this over, it might make you one of the few successful ones.

SANITARY ENGINEER AND PUBLIC HEALTH.

R. O. Wynne-Roberts Consulting Engineer, Toronto.

It is safe to state that the conservation of health is the highroad to wealth. It is seldom that sick men become wealthy, and it is equally true that unhealthy cities are virtually dead. The principle is the same for a cottage as for a palace and for a village as for the metropolis. The microbes of disease have no respect for anybody who neglects to adopt safeguards against such dangers. Sanitarians of all classes, then, are performing a great duty to the public when they regard their craft or profession in the right and proper spirit and carry out their work with the object of securing the greatest possible efficiency.

Sanitary engineering may be stated in general terms to comprise everything that leads to the bodily comfort of the people. This would, of course, include the cleanliness of towns, the erection of healthy homes and desirable workshops, the providing of appropriate places of recreation, and institutions of education.

Our ancestors had not all these good things and yet they not only survived, but produced a race that possesses a more or less sturdy constitution.

Sanitary engineering, as we know it, is a recent development. The Israelites had a good idea of sanitation; the Romans also had some excellent sanitary systems, and yet that would only account for a part of the truth. Our ancestors were lovers of country life, with its healthful atmosphere, pure water, plain food, and abundant exercise.

Owing to the modern tendency of living in cities and towns, sanitary engineers are striving to bring the virtues of country life into the cities. The impure air which is inherent in towns has to be purified by the speedy removal of all filth; by effectual ventilation and circulation, by the heating of the houses, workshops, schools and public institutions and the elimination of smoke. Pure water must be provided, that is its source of supply must be free from pollution, and the chances of contamination by any means should be removed. Its supply should be adequate and made easily available.

To carry out all these things, it is easily seen that it means the men who are engaged in the work must be trained, that they are to be endowed with an enthusiasm for the highest state of perfection as they can achieve. They are also to be apostles preaching the gospel of sanitation up and down the land, never relaxing in their work and in due time their services will be fully appreciated by those for whom sanitary engineers labor.

NEW BOOKLETS.
MODIFIED SYSTEM FOR ESTIMATING RADIATION.

By Carleton F. Tweed.

The above is the title of a booklet which is being distributed free upon application by The Dole Valve Company Chicago. It contains a mine of real good original data, with charts, tables and plans, and will be found very interesting to every heating engineer. It is highly illustrated and contains various specially compiled tables. Those desiring to procure one of these booklets should write to the Dole Valve Company, 208 North Fifth Avenue, Chicago.

OPENS OFFICE IN TORONTO.

R. O. Wynne-Roberts has opened an office at 310 Temple Building, Bay st., Toronto and will operate as a consulting sanitary engineer. Mr. Wynne-Roberts has taken a deep personal interest in sanitary engineering for over a generation. He became a member by examination of the Royal Sanitary Institute, about 1890 and has been actively associated with that institution ever since. He was examiner of the Royal Sanitary Institute in Capetown, London and Cardiff, and has lectured to sanitary engineers in those cities as well as in Regina.

He was elected to the highest position of Fellow of the Royal Sanitary Institute and was until recently the only one in Canada. Mr. Wynne-Roberts has held offices as city engineer for 24 years and has been in practice as a consulting engineer for over 8 years. He is a member of the Institute of Civil Engineers, of the Canadian Society of Civil Engineers, of the American Society of Civil Engineers, and of several other technical societies.

Mr. Wynne-Roberts has for many years contributed papers and articles on sanitary problems to various journals and we anticipate the pleasure of publishing some from his pen in the near future. Among his contributions were those on "Economies of Water Waste in Cities;" "Antigated Sludge Process of Sewage Treatment;" "Notes on Water Supply;" "Water Supply Problems of the West," etc., etc.

Practical Course for Sheet Metal Workers

ARTICLE No. 21 OF SERIES

By CHARLES SEIVERS

In this is shown a round pipe resting on a roof of one pitch or slope, with flange for pipe at roof line. In Fig. 1, or the side view, let A-B represent the slope of the roof, and C-D-E-F the elevation of pipe joining same. To develop pattern for pipe with cut to fit the roof proceed as if cutting a section of an elbow, on C-D or on a line parallel to it as G-H, draw a half section of the pipe as shown by semicircle, and divide into a number of equal parts as shown by 1, 2, 3, 4, etc., from these points draw lines parallel with D-F, extending them until they join the lines C-D and E-F, our next step is to draw two parallel stretchout lines as K-K and L-L, now erect lines at right angles to L-L joining to K-K as shown line on either end at K-L. From this point, set off with the compasses or dividers the spaces 1, 2, 3, 4, etc., on section on line G-H, repeating to make the circumference complete. With compasses measure distance from line C-D, to the point on line E-F which is intersected by the lines drawn from points in section on line G-H, commencing at C, measure the distance C to E, and set off from line L-L on line K-L. Measure the next line 8, to its intersection at E-F, and set off from L-L on second line, which can be numbered 8 to correspond to line on C-D. Measure the next line 7 to its intersection with E-F and set off from L-L on line 7. Proceed in same manner with remaining lines 6, 5, 4, 3, 2, 1, which will form one-half the pattern, to complete full diameter repeat as shown on lines 2, 3, 4, 5, 6, 7 in the same manner. A line drawn through the points obtained will give outline of pattern required.

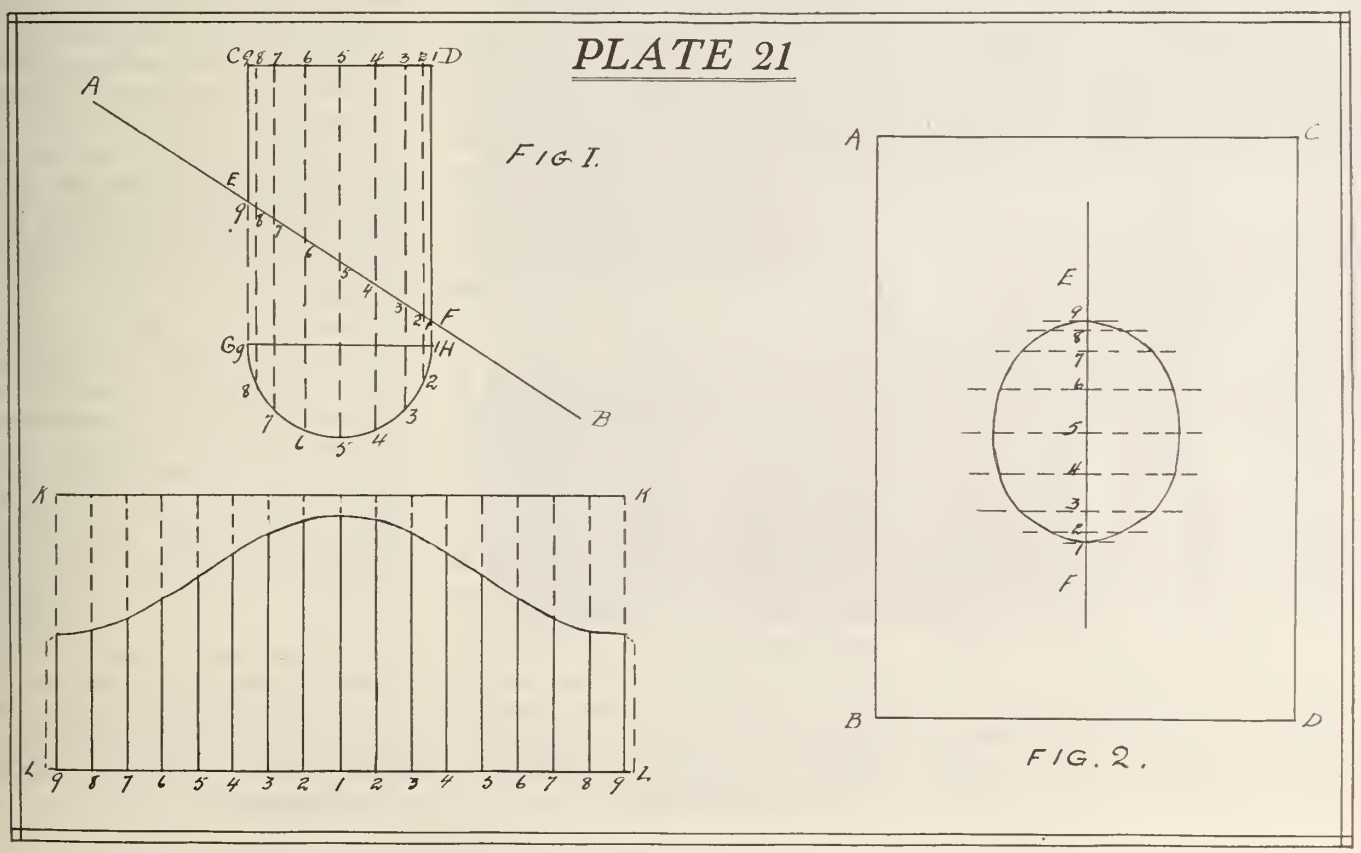
To obtain pattern of flange with opening for pipe, draw the outline of flange as shown in Fig. 2, by A-B-C-D, draw a line through the centre of flange, parallel with A-B, as E-F, on this line set off the spaces between E and F, found by the lines drawn from section G-H in Fig. 1. With compasses measure from line G-H to the points of circumference as marked by divisions 1, 2, 3, etc., and set off on both sides of line E-F, on flange, Fig. 2. Setting distances obtained on lines numbered to correspond, as shown at point 1 on line 1, 2 on line 2, 3 on line 3, etc. A line drawn through points obtained will give outline of opening in flange to receive pipe.

START CAMPAIGN FOR CLEANING CITY.

Montreal, March 6.—The "clean-up campaign" to be held in May was officially launched to-day, when a gathering of civic authorities, officials, and various organizations interested, met at the Montreal Publicity Association headquarters, and received promises of support from everybody concerned.

Addresses were given by Dr. Bouchier, M.O.H.; Fire Chief Tremblay, Mr. Nantel, of the Incineration Department; Controller McDonald, Ald. Dr. Leslie Boyd, Mrs. Renouf, of the Women's Club, and Mrs. Ashcroft, of the Housewives' League, as well as by F. A. Couvert, the chairman of the committee, and F. Abrahams, the chairman of the association.

Vancouver. B.C.—Anderson & Warnock have dissolved partnership.



"Gas Talks" to Sanitary Engineers

How Window Displays May be Made to Draw Business—The Store Costs Money and Should be Made to pay its Share of the Cost of Doing Business.

By E. M. Patterson Consumers Gas Co., Toronto.

Article No. 2.

IN recent issues of this journal, pictures of store windows which have proven a source of profit to their owners have been reproduced with an accompanying description. What one man has done—another one may do—and every sanitary engineer who is fortunate enough to have a show window in connection with his premises, can make it a valuable asset to his business at a small outlay and with a little periodical care and thought

The majority of the larger retail merchants—in whatever line of business they may be—will tell you that the most valuable portion of their store, from an earning standpoint, is their store front. By the means of their show windows they are enabled to attract and hold the attention of passersby, displaying their goods in such a manner as will appeal to prospective customers. This is undoubtedly one of the best forms of advertising, as it introduces the actual goods to the consumer and acts as a silent salesman to the passing public.

Sanitary engineers in this connection are in exactly the same condition as other merchants. They have goods to sell and install. New supplies and appliances are being placed on the market day by day, which need introducing, to the public, and there is no better medium than the well arranged store front. If you have a window which can be used as a show window—you have a means of increasing your profits—of making yourself better known to your prospective clients. The possession of the show window has increased your expenses in the shape of taxes, etc. Why not make it produce these extra expenses. Every inch of your window space is valuable and can be made more so.

The percentage of sanitary engineers, who, having show windows make good and profitable use of same—cannot be more than 1 in 6—the remaining 5 out of the 6 are missing their windows, thereby losing opportunities day by day of increasing their business.

This state of things should not be. There is no reason why the window of a sanitary engineer's establishment should not be just as attractive as that of his neighbor in the same vicinity.

The more up-to-date sanitary engineers have proven this to be the case, and in many instances are deriving a steady profit from the proper use of the show space at their disposal.

Take the case of the sanitary engineer who made a display of gas water heaters, and who in the month of June alone sold 22 heaters as a result of this display—showing a net profit of over 100 dollars on this item alone. Is not this in itself worth having without mentioning the increase of business which naturally results in other directions?

Of course it is not likely that every sanitary engineer could do as well as this, but they all can try, and will undoubtedly reap a benefit proportionate with their efforts.

Some men will say that the scope of a sanitary engineer's display is limited, that there is not enough variety in the goods. This is true to some extent, but can be overcome by using a variety of ways to display the goods.

What would prove more attractive to the average housewife than a model "all gas" kitchen display—every article shown in such a display can be sold by the sanitary engineer and installed at a fair profit, and the nature of the display is quite attractive. "Cleanliness is, next to Godliness," and a kitchen cleaner than an all gas kitchen is not conceivable. The aim of the plumbing trade is to promote cleanliness, and what is more natural than to sell appliances that help to keep the house clean.

Another very attractive display can be made by installing a gas water heater, with tank and basin, showing the public how easy it is to obtain a constant supply of hot water. Without any inconvenience and at small cost.

An up-to-date bathroom might also be featured with success, besides other displays too numerous to mention.

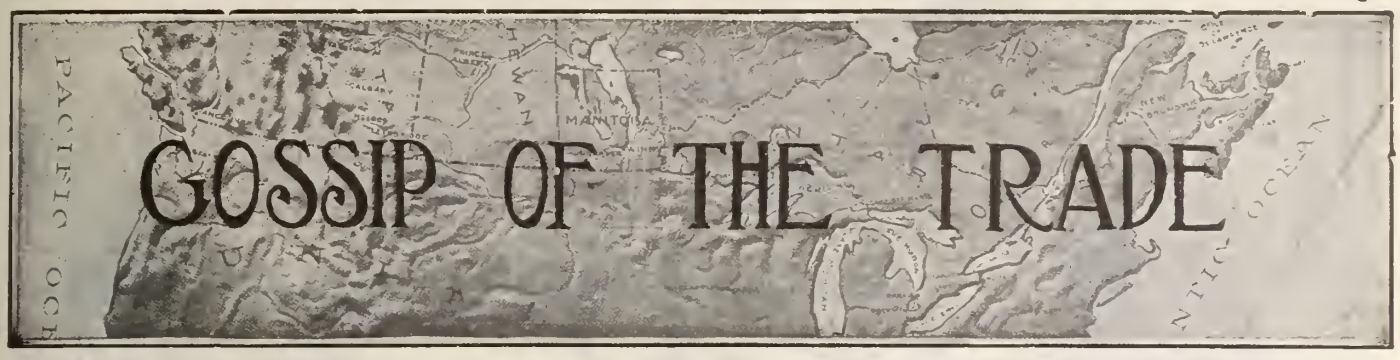
As for the fixtures, etc., necessary to display the various appliances sold by sanitary engineers, a movable partition decorated in the same manner as the actual wall, preferably to represent a bathroom or kitchen, to be used as a background, a sufficient quantity of linoleum to cover the floor, of the same effect as the wall, and to match same in color, are practically all that are really needed, and these only that the appliances may be displayed in their natural surroundings.

The sanitary engineer who is willing to take every advantage that is to be obtained by the possession of a show window, will find the manufacturers and supply houses always willing to aid him, it is to their interest as well as to his that the goods should be displayed in an up-to-date and attractive manner, therefore their help and the benefit of their experience can be relied on.

There are one or two points that it is necessary to follow in order that window and shop displays should be a success, the most important of these is of course cleanliness, nothing tends to "kill" a display more than the presence of dust and dirt—show the fittings and appliances together with their surroundings in the same condition as a good housewife will keep them—the few minutes spent in keeping the window free of dust will be well spent.

Another point very desirable to follow, is to make the displays as far as possible seasonable, the seasons and weather condition govern trade to quite a large extent, and there is nothing like making a display of a particular appliance at the proper time, when the need for the particular appliance is likely to be felt the most.

Sanitary engineers will also find that local advertising in connection with their window display is very helpful. Concentrated advertising is unquestionably advantageous to the advertiser, newspaper and postal efforts backing up the window display will help the latter immensely. Just a final word, you that have show windows that face on to any thoroughfare, be it a main street, or otherwise, use them, they are needed in your business, they will help to show the public that you are in business, that you are looking for business, and willing and able to supply "up-to-date" fixtures and appliances in an "up-to-date," safe and sanitary manner.



NEW ESTABLISHMENT.

The Dominion Radiator Co., Ltd., Toronto, are fitting up a new show room at 26 MacNab street, S. Hamilton, where they will carry a full line of boilers, radiators and heating accessories.

GONE TO THE FRONT.

Mr. Harry Schurman, plumber with the firm of T. P. Calkin & Co., Kentville, has resigned his position and has enlisted with the 40th Battalion. He left on the 20th ult. for Valcartier.

SANITARY LAW ENFORCED

There is a great deal of difference between having a good plumbing by-law in force, and enforcing it.

Many towns and cities have clauses which demand this, that and the other but when it comes to enforcing these clauses it is another matter.

Not so, however, with the sanitary inspector of Guelph, Ontario, who is enforcing the by-law with strictness and impartiality.

Mr. R. J. CLUFF RESIGNS

Mr. R. J. Cluff has resigned his position as general manager of Steel and Radiation. Mr. Cluff has several interests in Toronto apart from his interests in Steel and Radiation, but for the present will devote himself to the filling of war orders.

In this connection it may be well to state that the Cluff Manufacturing Co., Ltd., of "Vitro" fame, have entered the shell manufacturing industry. This is not by any means a part of the "Vitro" plant, but an entirely new enterprise; upwards of $100,000 worth of equipment is involved in this last new venture.

UNDERGONE OPERATION

As Sanitary Engineer was on the press the information came to us that Bob Shannon, one of the most enthusiastic sanitary engineers in Toronto, had been taken to the hospital afflicted with appendicitis. An operation has been performed which so far has proved successful. Bob is a live wire and has the respect of every one of his fellow craftsmen. The Sanitary Engineer joins in the hope that he will soon be up and around, and all the better after the operation.

Toronto and Buffalo Event

Splendid Day Enjoyed by All—Quite a Number Present Who Visited Toronto Ten Years Ago.

NOTHING tends to unite businessmen more closely than social intercourse. The outing committee of the Toronto society deserve credit for the program arranged when the Buffalo Master Plumbers paid a visit to Toronto, August 19th.

Program.

10.30 a.m.—Upon arrival of Niagara boat at Yonge street wharf, automobile drive around the city, ending at Bay St. wharf.

12.00 noon—Special ferry leaves Bay St. wharf for Hanlan's Point.

(Continued on page 30.)

1. *"The Sunny Jims" of the trade, beginning with a representative of James Robertson Co. and ending with one of James Morrison Co.'s boosters. Both these firms are pioneer manufacturers in the plumbing line. 2. Three more live-wire salesmen. 3. The Toronto Outing Committee who have made this a year of picnics and outings. 4. Left to right: W. Meadows, chief plumbing inspector, Toronto; W. T. White, Buffalo's chief plumber inspector. Both are also members of their respective examination boards.*

Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WHY USE A VALVE OR SYPHON IN SEPTIC TANK?

Editor The Sanitary Engineer.

I am a subscriber of your paper, and would like you to give me the following information:

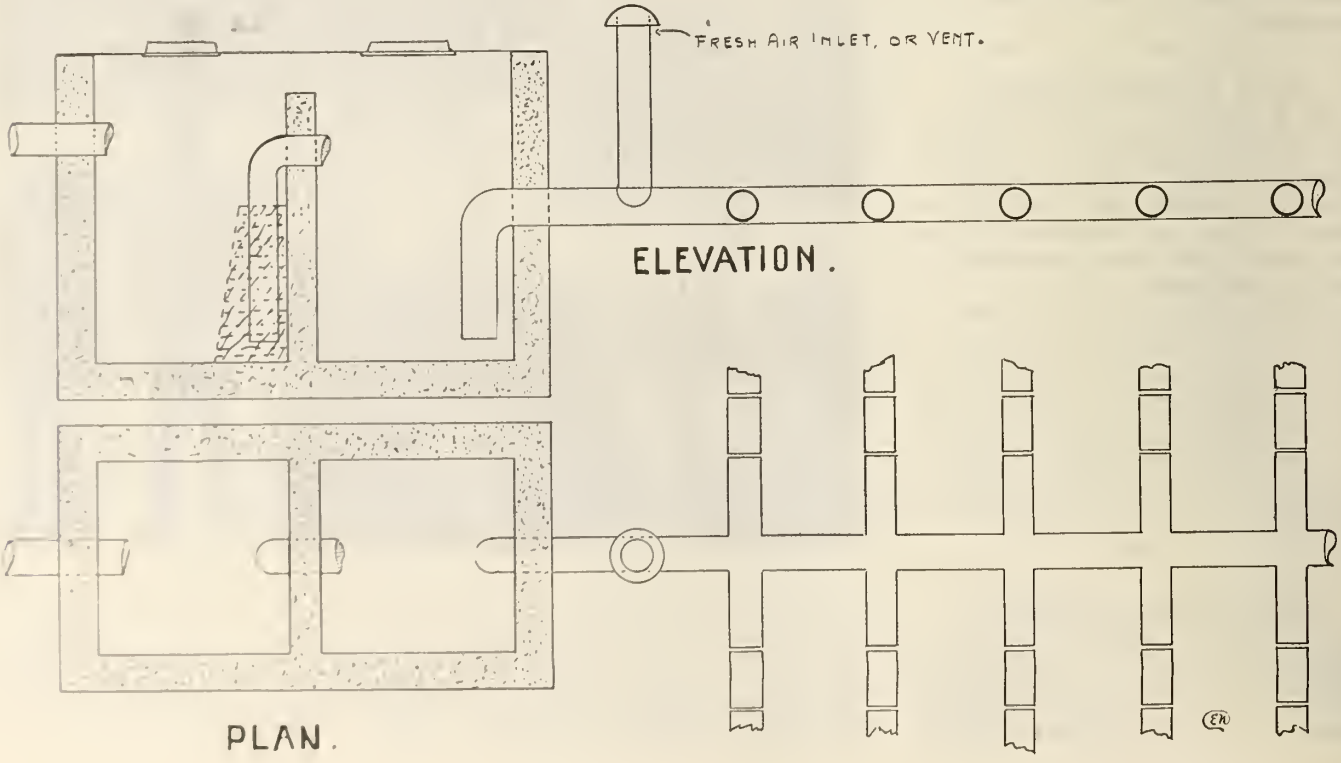
What is the particular advantage of the dosing chamber apartment in a septic tank, having a flush valve or syphon over the tank feeding the weeping tile from the bottom, as shown in the enclosed drawing?

Further, if a residence having a septic tank system of sewage disposal was vacated in the winter time for a month or so, would covering the tank and field tile with a heavy layer of manure ensure the working of the system on the occupant's return, providing the manure place in the septic tank, and the purpose was not removed until the field tile was filled once? M. G. F.

Replying to M. G. F. as regards the septic tank, dosing chamber and valve, etc., to describe this properly it will be necessary to explain what action takes for which the dosing chamber is required.

The raw sewage first enters the tank nearest the house. Bacteria begins to work, and as soon as all action has ceased, the sewage which is ready for discharging has fallen to the bottom of the tank. It takes several weeks and sometimes months before the germs have become thoroughly cultivated. But this cannot be overcome unless a quantity of sewage already cultivated can be transferred from a septic tank already in long use.

The fluid from the bottom of the first tank begins to overflow into the dosing chamber and is retained, or should be retained, not less than 24 hours. It is dosing or resting, and has no new uncultivated sewage mixed with it. It then discharges into the field tile, and the aerobic bacteria begin their work, and will continue so to do until all the fluid is disposed of and the tiles are again empty and resting. The reason why a valve or syphon is necessary is because the earth will become sick or waterlogged by a continual flow of sewage and the bacteria could not act in a natural manner. Referring to the sketch submitted, which we herewith reproduce, this tank could not give the satisfaction it should, and if we understand the sketch aright, we would think that the



tile pipe would always be full while there is any fluid in the second tank, because the bend at the discharge is lower than the head of sewage. It may be a long time before any trouble would be apparent, but the danger would be there, and the ground surrounding could not help but become putrid in time.

Referring to the suggestion as to covering a disposal system with manure for a month or so, this no doubt would be all right, providing the temperature did not drop too low. It would answer at a temperature of about 4 or 5 degs. below zero, providing, too, that there was no rain came down upon the manure, causing it to become water-soaked.

If, however, a septic tank and sewage disposal bed was to be vacated, the best thing to do would be to make provisions in this way:

Allow the sewage in the dosing chamber to flush out completely. Then pump about half the contents of the first tank from the bottom into the dosing chamber and flush it out into the tile pipe about twenty-four hours after the dosing chamber had been previously discharged. Then cover the top of the tank with a layer of straight straw, and cover with good manure with as little straw in it as possible. The tile pipe does not need to be covered, except as a precautionary measure.—Editor.

WHO'S RIGHT?

Editor The Sanitary Engineer.

Until recently I was employed in a country town in the West and the custom was to use a tank in which all the sewage was deposited. The outlet was on the same level as the inlet and the sewage discharged into about three or four cubic feet of loose stones. I have now moved into another district, and have become a subscriber to your journal. I note that you advocate a valve or syphon and a tank with two divisions in it. I understand that the health department in the City of Toronto adopt the first tank I spoke of, and would like to know who is right?

Would you kindly let me know at the same time how lead traps are vented in Toronto, and whether you recommend their method? I've recently heard that they have done away with crown venting.

A New Subscriber.

We have reproduced herewith in Figs. 1 and 2 the styles of septic tank which are adopted in the City of Toronto. Fig. 1 is the tank which our subscriber evidently refers to. From inquiries at the Board of Health office, we are informed that this tank is simply allowed as a very temporary thing, and there is also some kind of bond to be signed by every applicant who desires to construct such a tank. It has to be cleaned out as often as the health office demands, and the applicant has also to agree to destroy the tank and connect up his house plumbing to any sewer which may be constructed in the district.

If a septic tank is installed in the City of Toronto it is where there are no sewers near, and if by chance a permanent septic tank has to be installed, for instance, over on the Toronto Island, Hanlan's Point, or any other district where such a tank would be permanent, it must be constructed in quite a different manner to Fig. 1. Fig. 2 shows the style of tank. It is fitted with a syphon valve, and is a tank of three compartments.

Regarding the method adopted in Toronto of lead trap venting, Fig. 3 shows complete set of methods allowed by the health department.

The Sanitary Engineer believes in this method of venting adopted by the City of Toronto, and would have all crown venting abolished if it had its own way.—Editor.

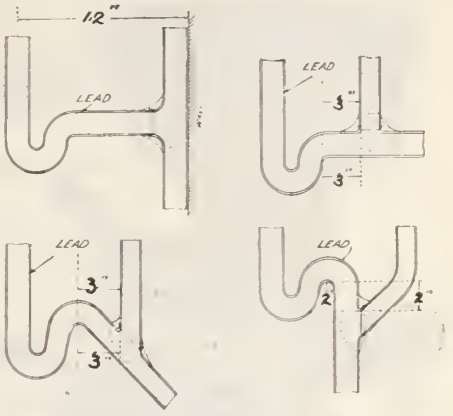


Fig. 3.

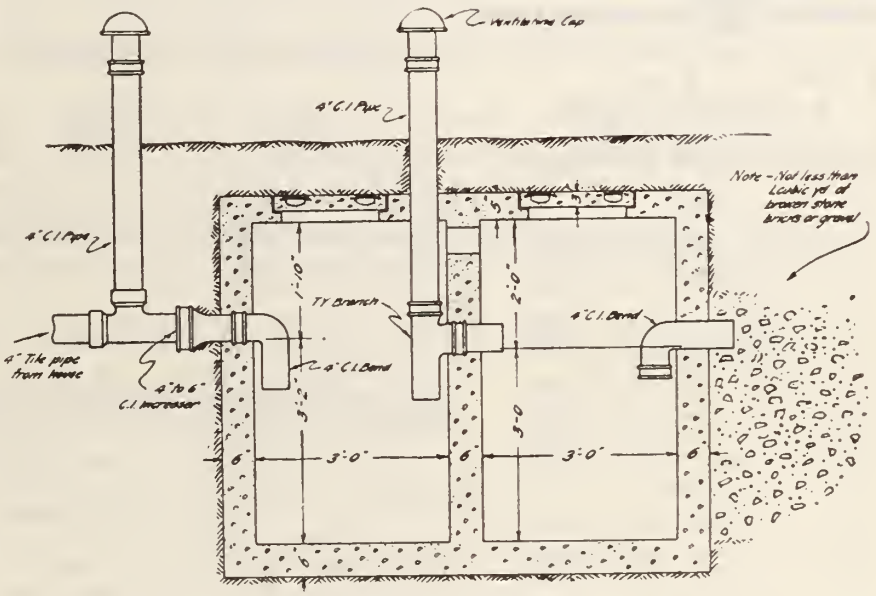


Fig. 1—Temporary septic tank for use in Toronto.

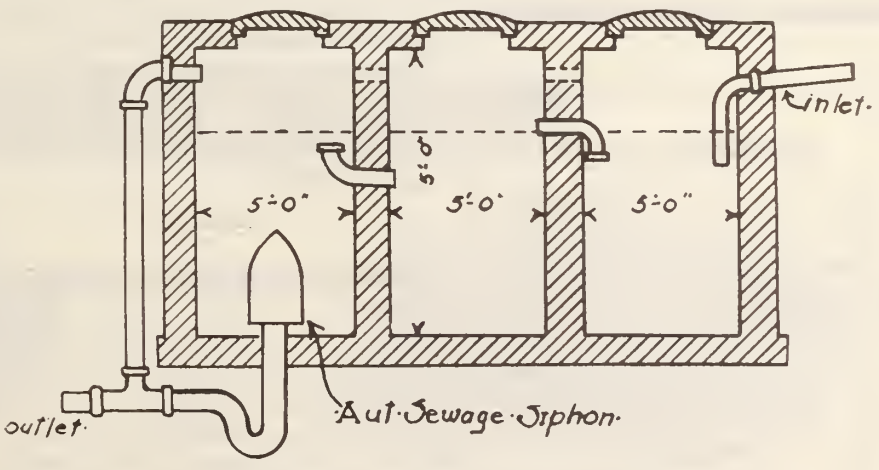


Fig. 2—Permanent septic tank used in Toronto.

PURO
MADE IN CANADA

Good-bye
GERM-LADEN DRINKING CUP

The old fashioned public drinking cup, with its disease-carrying possibilities, is rapidly disappearing as a result of the movement advocating "Safety First" where drinking water is concerned.

This movement is creating a big demand for some simple, sanitary device to replace the discarded cup in thousands of factories, offices, public parks, schools, etc.

THERE IS AN UNUSUAL OPPORTUNITY FOR THE LIVE SANITARY ENGINEER TO MATERIALLY INCREASE HIS TURNOVER BY GETTING AFTER THE SCHOOL BOARDS, OFFICES, FACTORIES, ETC., IN HIS NEIGHBORHOOD.

Bring the merits of the

Puro Sanitary Drinking Fountain

before your prospects. They will readily appreciate its many attractive features, particularly its simple automatic control. Drop us a card today and let us show you the profits within your easy reach.

Puro Sanitary Drinking Fountain Company
147 University Ave., Toronto, Canada

Advertising

"Advertising is the education of the public as to who you are, where you are, and what you have to offer in the way of skill, talent or commodity. The only man who should not advertise is the man who has nothing to offer the world in the way of commodity or service."—*Elbert Hubbard.*

TORONTO AND BUFFALO EVENT

(Continued from page 27.)

12.30 p.m.—Dinner at Pavilion, Hanlan's Point.

1.30 p.m.—Baseball game—Buffalo vs. Toronto Sanitary Engineers.

On account of the military activities at the wharf the program was a little delayed.

When the Buffalo boat arrived the wharf was crowded with soldiers going into camp at Niagara, and several members of the Buffalo craft remarked that the Toronto boys had certainly excelled themselves in providing a military reception.

However, in spite of lateness the program was carried out without a hitch, except that only four innings in the baseball game were played off.

The players were:

TORONTO TEAM—Messrs. Travis, Abbott, Wright, Griffith, Shannon, Price, E. Byrnes, Menzie and R. Byrnes.

BUFFALO TEAM—Messrs. Wilson, Radiee, Smith, McGannell, Kellar, Breshanhan, Renner, Dechart and Franke.

Both teams played a splendid game which ended in favor of Buffalo 5 to 4. At the conclusion of the game, everyone joined in a hurried snack at the pavilion and back to the boat. The good ship Corona being a little late in coming in the military band which had been provided, and which by the way escorted the visitors round Hanlan's Point, played quite a number of popular selections, thus assisting in passing away the time in a very pleasant manner.

Some ten years ago, to be accurate, Aug. 3rd, 1905, the Buffalo craft paid a similar visit to Toronto, and quite a number who were present on that occasion were present at this event. They expressed great surprise at the wonderful growth of Toronto, quite a large number of improvements being noticeable.

It should be stated that the Buffalo boys carried off the laurels in 1905 just as they did this year. Though they admitted that as entertainers the Toronto boys would require some beating.

However, this statement remains to be proven. At some future date the Toronto society purpose taking advantage of a pressing invitation to pay a return visit to Buffalo.

SANITARY SCIENCE COURSE

(Continued from page 17.)

10 feet and h is 40 feet, q is found to be 1-5 of Q, or theoretically 4-5 of the water is wasted at valve A and 1-5 is raised 50 feet. In practice the efficiency of the ram will depend to some extent on its manufacture. Manufacturers have a common rule that, for average conditions, 1-7 of the amount of water supplied to the ram can be raised to a height of five times that of the fall in the drive pipe. This represents an efficieney of about 2-3 and a general rule could be given:

$$q = 2\text{-}3 \times \frac{Q\ H}{(H + h)}$$

With a small ram having a fall of 10 feet in the drive pipe and raising the water 50 feet above the ram the amount raised is about 1 gallon in 4 minutes. Rams are made in various sizes delivering practically any quantity desired.

It has been stated that an hydraulic ram with a fall of 10 feet in the drive pipe raised water 340 feet high through a discharge pipe 3 miles long.

Fig. 26 shows the working parts of an hydraulic ram as illustrated in the catalogue of the R. McDougall Co., of Galt.

(Continued in Next Issue.)

SERVICE.

Harry Yankey.

That's the Twentieth Century cost price of sueeess!

That's what the world demands.

Do you give it? Do you satisfy the wants of all your patrons? Every one of them?

If you do not, man, I say, "Wake up."

One failure means the loss of a customer, and his knocks may mean a dozen. It also means more business for your competitor. Do you think you can afford it? You may think you can, but I tell you, you can't.

Get busy, give satisfaction.

Yesterday's methods won't go to-day. To-morrow's instead are what mean prosperity. Think of some new service for those who depend on you. If you're too much of a jelly-fish to think, let some one else do it for you. Then act. Act, That's the way to trade your runabout for a six-cylinder. Get busy, the opportunity's here. But the other fellow is going to grab it if you don't hurry. Action now; there's the telephone at your elbow.

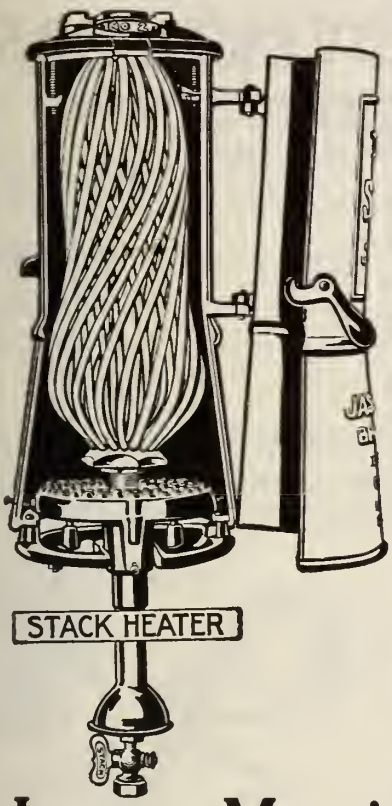
If you consider yourself a worm of the dust you must expect people to trample on you. If you make a door-mat of yourself, people are sure to wipe their feet on you.

* * *

More men fail through ignorance of their strength than through knowledge of their weakness.

* * *

You may succeed when others do not believe in you, but never when you do not believe in yourself.



DURABILITY
Stack Gas Water Heater

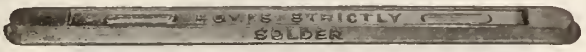
The STACK water heater has been on the market for over 10 years, and in that time has given absolutely no trouble. There is no point in heater where it is possible for sediment to lodge and form a coating between the heat and the water.

The absence of any lodged sediment makes it impossible for the STACK to burn out.

The rapidly moving heated water prevents the possibility of any stoppage.

James Morrison Brass Mfg. Co., Limited
93-97 Adelaide Street West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



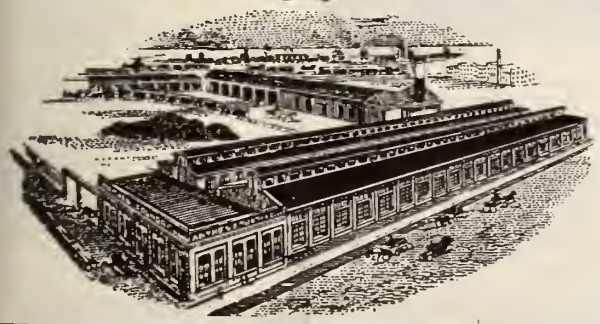
We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

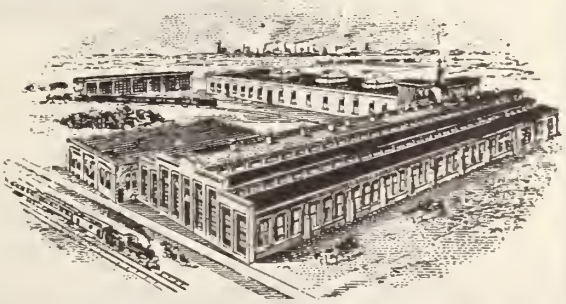
Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO
New York, N. Y.; London, Eng.; St. Louis, Mo.

TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG



MANUFACTURERS OF
CAST IRON SOIL PIPE AND FITTINGS



ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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STANDARD AND EXTRA HEAVY

FLANGED FITTINGS AND FLANGES

Manufactured by

INTERNATIONAL MALLEABLE IRON CO., Limited, Guelph, Ontario

FOR STRENGTH DURABILITY AND EFFICIENCY

GET IDEAL CHAIN WRENCHES

GRIPS PIPE, FITTINGS, CASTINGS of all kinds, regardless of size, shape or their location.

The combination of V Jaws and Regular Jaws

GRIPS EVERYTHING

Square Bead or Flange

Round Bead

Order Now.

The Combination Jaws

At Your Jobber

Kr eschell Bros. Company, Mfrs.
475 W. Erie St.,
CHICAGO

KINDLY MENTION THIS PAPER WHEN WRITING ADVERTISERS

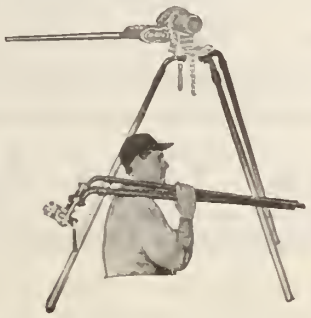
WILLIAMS' "VULCAN" CHAIN PIPE VISES

Are Handier Than Ever Now!

With a Clamp for Bench Work

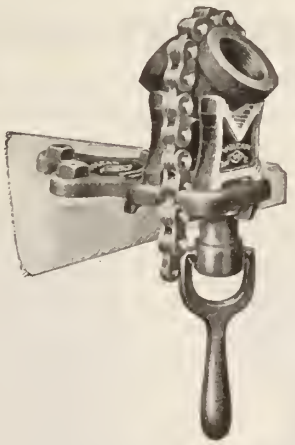
A strong Drop-Forged Clamp with Wrought Steel Screw and Swivel, specially "heat treated" to give extra strength and toughness, that is admirably adapted to enlarge the usefulness of the VULCAN VISE on Bench, Table, Sill or Chair

And a Light Mount for Field Work



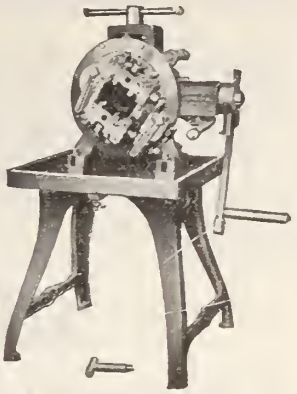
Firm and portable, and furnished with or without the "Legs" of Standard Pipe Sizes, simple and conveuieut, that fills a long-felt need.

Vulcan Chain Pipe Vises are First Aid to Plumbing Work



Write for Circular to

J. H. WILLIAMS & CO.
77 Richards St.
Brooklyn, New York City



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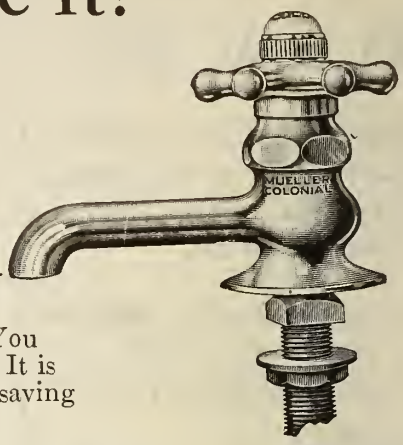

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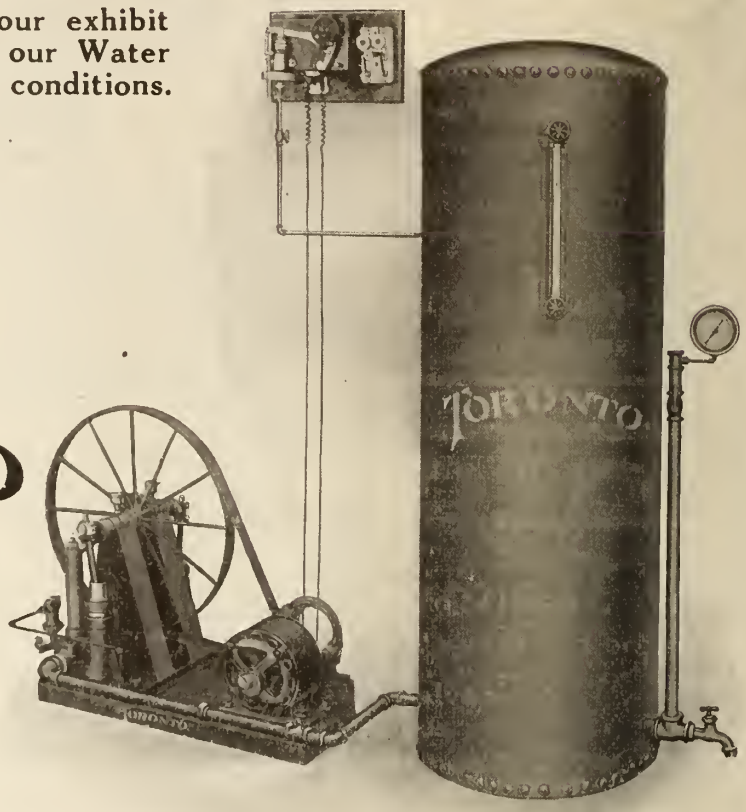

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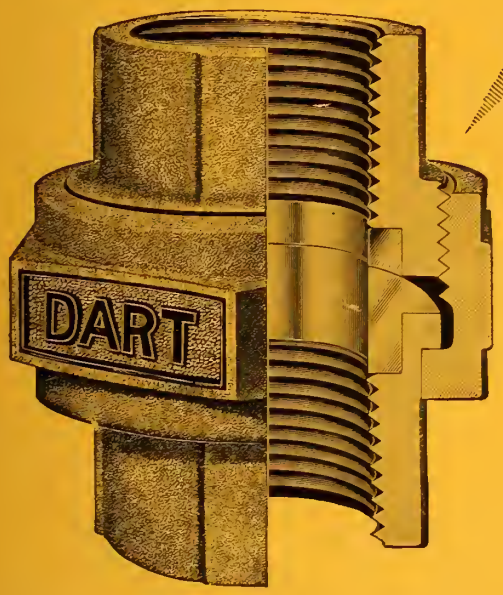

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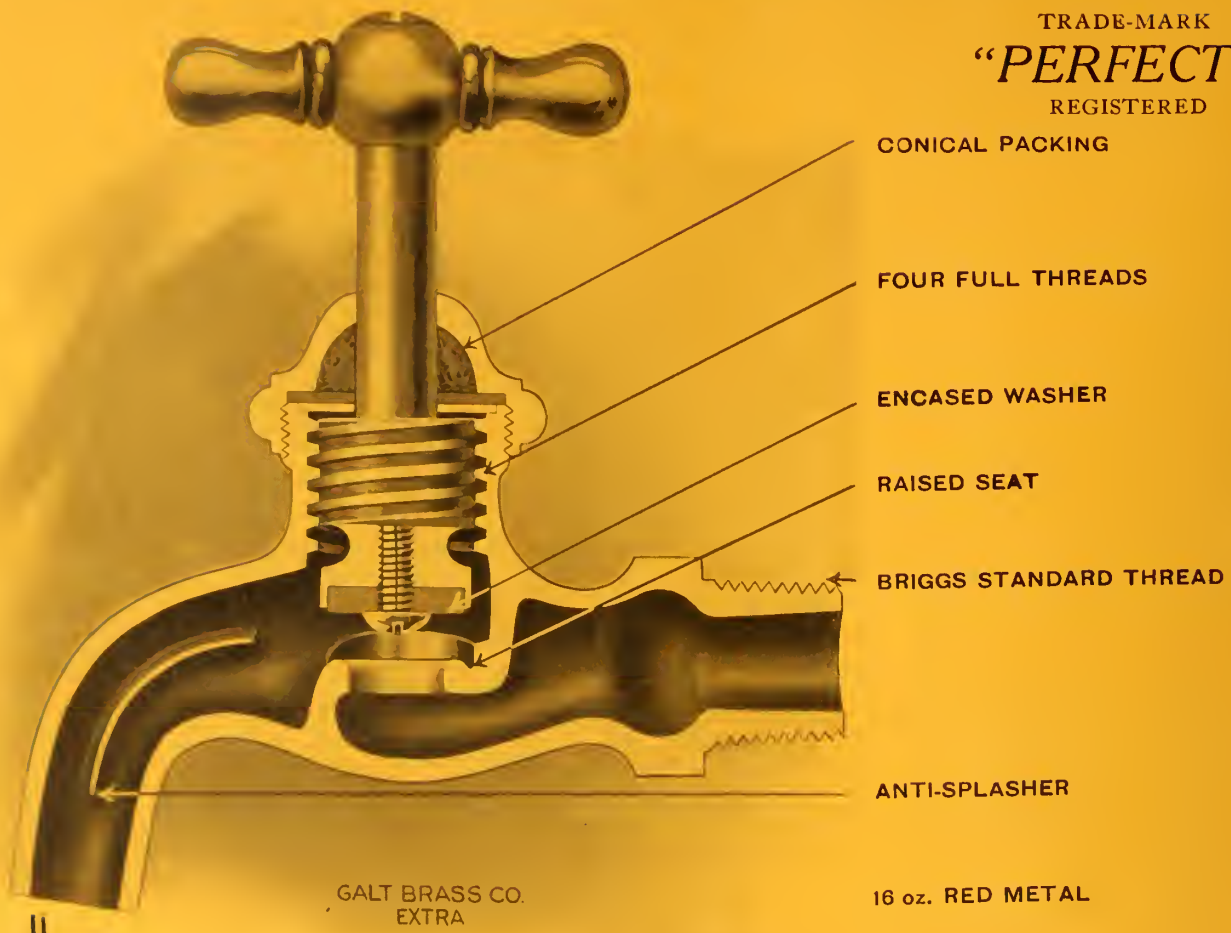

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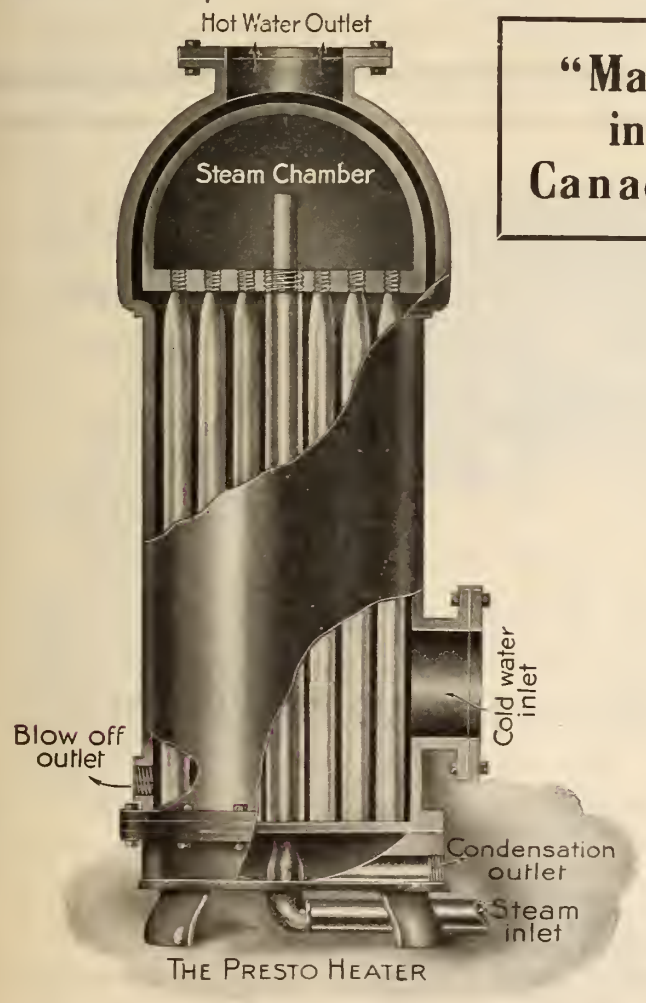

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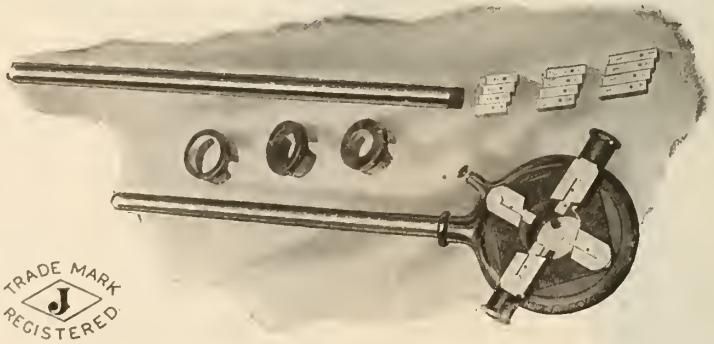

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Ratchet allows threading to be easily done in ditches or positions close to walls or ceilings. A man can easily thread a two-inch pipe with this tool. Will thread a very short piece of pipe.

The Correct Cutting Principle of the Lathe Tool is Applied to the Cutters of

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As the tool advances on the pipe the cutters open out so as to make a proper taper on the thread. The cutting is all done by the mouth of cutter. The back threads don't cut, they don't rub on the thread, they merely steady the tool.

The threads are as clean and perfect as if cut in a lathe.

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" " " " 6" " " 16 minutes.
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Other superior features are, viz.:
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A set of cutters for each size of pipe.
Adjustable to all variations of fittings.
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RADIATORS
Give Universal Satisfaction.

Specify these and ensure
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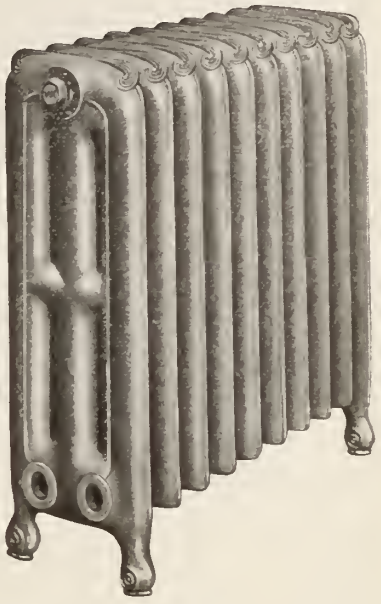

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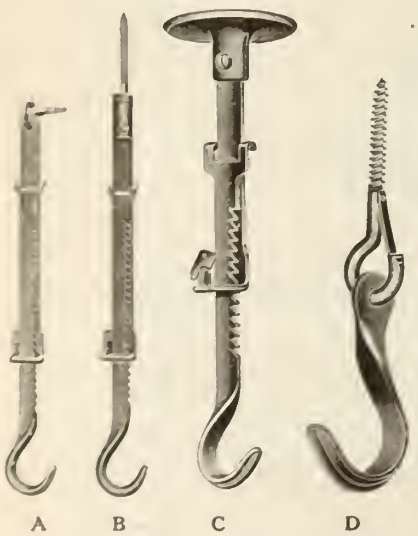

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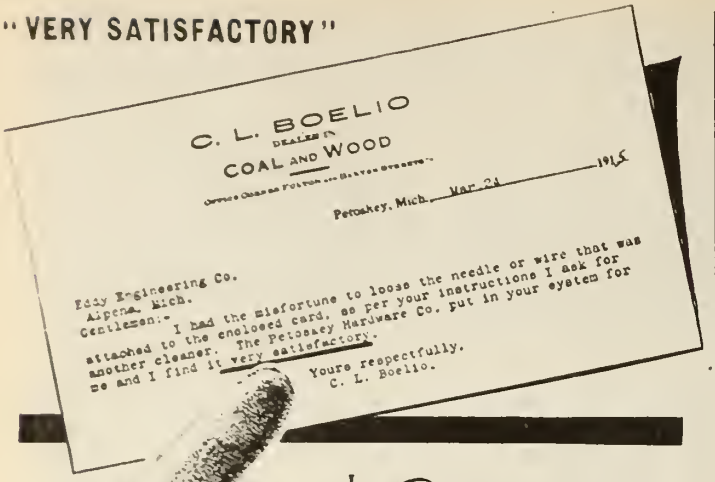
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PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, SEPTEMBER 15, 1915 No. 18

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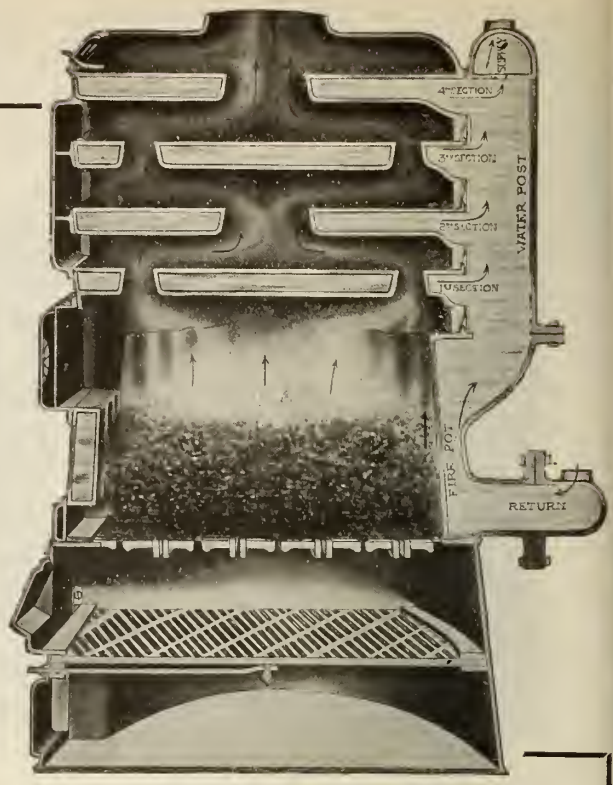

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THE SANITARY ENGINEER

VOL. IX. SEPTEMBER 15, 1915 No. 16

The Value of the Smokeless Boiler

First Cost is Last Cost—Smokeless Boilers Save Fuel and Time, and do Not Pollute Surrounding Atmosphere—True Sanitary Engineers Endorse Their Use as Also do the Medical Faculty.

WHEN a person is asked to buy a hot water or steam boiler, he is entitled to receive the best value for his money. Every reader of The Sanitary Engineer will agree with this assertion, but how do we try to follow it out in practice? When a person wishes to install such a furnace, he should be shown the best; he should be asked certain questions, such as: (1) Do you want to buy a furnace which will no doubt heat your house, but while doing so will require someone constantly shovelling on coal or poking it up?, (2) Do you want a furnace that will become easily clogged up with soot and ash dust? or (3) Do you want a furnace which will burn the least amount of fuel, will require little or no attention except night and morning?

If you desire a furnace which will save fuel, that is which will burn up all the heat properties in coal and give off heat more readily than the ordinary furnace, then you must pay the price. You are then not only buying a furnace, but you are buying service, efficiency, real brains plus so much cast iron or metal in the form of a furnace.

To-day there are instances where ordinary boilers, which but a few years ago were the best to be gotten, have been taken out and in less than three winters the new smokeless boilers, of which there are a number now on the market, have actually paid for themselves.

Now this is no exaggeration by any means, and it is a very common thing to hear of smokeless boilers consuming as much as 25 per cent. less fuel than the ordinary boilers. What does this mean?

To the person whose house requires for heating purposes 12 tons of coal at $8 per ton during the winter, it means $24 saved in one winter, plus all the ashes, soot, extra attention, etc.

It means more: $24 will pay 6 per cent. on a $400 investment, and a house which could be heated with an ordinary furnace would not need a furnace costing more than $120.

Now, suppose an ordinary furnace consuming 12 tons of fuel could be bought for $120 and a smokeless boiler cost twice that amount, the saving in fuel will pay for the furnace in five years, or rather it would pay 20 per cent. on the extra investment, as well as result in a saving in labor, attention, etc. Moreover, when a furnace, no matter of what make, is not heavy in fuel consumption, that furnace is not subject to as high a rate of depreciation. Therefore, at the end of a given period the actual wear and tear of a smokeless or fuel-saving furnace would be less than that of a veritable "coal eater."

Then there is another phase of the subject which most heating engineers have not taken into account, and that is the smoke nuisance.

Some of the finest buildings in the world to-day are being ruined by the unconsumed gases and smoke which are emitted from our furnace chimneys.

Speaking upon the question of the smoke nuisance at the annual meeting of the Conservation Commission, Dr. Frank D. Adams reports as follows:

"A source of fuel waste is represented by the smoke nuisance, which is becoming very pronounced in our large cities. While is difficult to prevent the smoke rising from the chimneys of private dwellings, this, in the cities of Canada, is relatively unimportant for, as a rule, hard coal is burned for domestic purposes. On the other hand, the immense volumes of smoke emitted from the stacks of many of the great power plants and factories of our large cities, as well as by locomotives and steamboats, can be greatly reduced or stopped by the installation of reliable smoke consumers, operated by firemen instructed in their proper use. Investigations show that in many cases such plants not only stop the smoke but pay the owners.

"The waste of fuel, however, is but a small part of the loss entailed by the smoke in our cities. It disfigures buildings, impairs the health of the population, renders the whole city filthy, destroys any beauty with which it may be naturally endowed, and tends, therefore, to make it a squalid and undesirable place of residence; this, at a time when economic influences are forcing into our cities an ever-increasing proportion of our population. These conditions press especially on the poor, who must reside in the cities and cannot escape from these evils by taking houses in the suburbs. After all, the conservation of humanity is even more important than the conservation of coal.

"Investigations into the best means of abating the smoke nuisance have been, and are now being, carried on by government and municipal commissions as well as by private individuals in several of the leading countries of the world. Many cities have officials whose time is devoted exclusively to the education of public opinion and the enforcement of existing laws with reference to this matter. The question as to what steps can best be taken to lessen the amount of smoke which is being discharged into the atmosphere in our Canadian cities is by no means a simple one, but the time has come when the Commission of Conservation may very properly make a thorough investigation of the question and ascertain for the benefit of the dwellers in our great cities what can be done to prevent the wholesale pollution of the atmosphere."

As Dr. Adams states, the loss of fuel is the smallest part of the loss. There is the loss of both light and life, thus giving us four sources of waste, which is a a direct result of improper combustion of coal—1st, loss of fuel; 2nd, damage to buildings; 3rd, loss of life; and 4th, loss of light.

Not very long ago Professor Asher, of Konigsberg, called attention to the fact that pneumonia was on the increase, and traced it directly to smoke from fuel.

In a lecture he gave, he said that since the year 1875 the death-rate of infants from pneumonia had increased throughout the world over 600 per cent., and

(Continued on page 29.)

Machinery for Women: By Ethel M. Chapman

And the Logic of its Relation to the Whole Farming Industry.

Reprinted from Farmer's Magazine

"Sweeping is one of the hardest parts of housework on account of the twisting motion that goes with it. The power vacuum cleaner or even the hand machine does away with all this."

MACHINERY for women means more than egg-beaters and paring machines and bread-mixers and washers that may or may not be easy to run. The things that promise a complete revolution in farm work for women are gasoline engines and dynamos and water-wheels supplying power for machinery in the house. This sounds extravagant and Utopian until you begin to think about it.

The problem is worth thinking about. The slowness of the evolution and adoption of machinery for women has been responsible for a lot of unfortunate conditions, among others a large measure of our rural depopulation. In fact it would be quite safe to say that in the majority of cases the movement from the farm to the city has been a woman movement—that while the men and boys may be filled with the traditional joy of the open spaces, the lure of plowed fields and the agriculturist's independence, the women are looking forward to the time when they can afford to move to town and have an enamel sink in the kitchen instead of a pump in the yard, and a bath-room upstairs, and electric lights instead of coal oil lamps, and less of what we call heavy farm work—work which is necessary and just as dignified as any other, but which machinery might be doing for us just as well as not. Don't make any mistake in gathering from this that the woman is looking for an easy time, or that with the dutiful, wool-spinning, cheese-making, up-at-all hours heroine of a past generation we have seen the passing of all that is self-sacrificing in woman. When you get to the bottom of things you will find that the motive is the same—progress for the family. The mother of to-day is just as willing to go on doing the hard, monotonous thing to-day and to-morrow and indefinitely if necessary and if she can hold out, so long as the welfare of the family is at stake. The reason for her dream of moving to town is to have advantages for the family. A lot of people think of taking the family to town, but comparatively few think of bringing the essential things of the town to the family.

It would be rather difficult to say that any one cause is responsible for this backwardness. In spite of all that we read to the contrary, the overworked woman is not usually a discontented woman—perhaps the degree of her contentment with conditions which might be improved, has got past the stage of being a virtue. The farm mortgage is just as much a night-mare to her as it is to her husband, and in many cases the home conveniences, especially the labor-savers, are not put in because she thinks they can't afford them yet. But there is a woman here and there who sees that the whole scheme of family life falls down if the home suffers. She and her husband begin to realize that it does not pay to build the farm up into a profitable property which may later be despised by the very children for whom they are giving their lives.

There's an economic feature here too. A farm home isn't like any other home. A farmer's home supplies a sort of economic foundation for his business as well as inspiration for his life. A home is a luxury for a poor man in any other profession; he has to stop and think whether he can afford it or not; but it is almost an absolute necessity to the poor man who owns and works a farm. Then it should be worth some outlay.

A Man's Problem

Neither is the trouble that men don't believe in machinery. Take the work of washing alone. If washing were suddenly to be put up to men, all the factories in Canada couldn't supply the demand there would be for washing-machines. No man would spend about one-seventh of his time scrubbing away at a wash-board. He would get the best machine he could find and then he would begin to hunt around for some form of power to run it. A year later he would be able to explain that it hadn't cost him a cent because it had paid for itself. Men have found that they can't afford to do without machinery, if for no other reason than the time it saves, but women haven't learned yet to reckon their time as being worth anything. And then you can't get away from the fact that most women are afraid of machinery. Suggest an electric washer and they're afraid of a shock, or that they might get it started going and couldn't get it stopped, or that it would wear out the clothes. Mention running the machine with a gasoline engine, and they imme-

"There was a time when women did the milking. As soon as men began to milk, they began to see how silly it was to spend an hour or two every day at work which could be accomplished just as well by a piece of rubber and a pump."

diately have a presentiment of being caught in the belt. It is no use to tell them that the current of 110 volts which engineers have decided is best adapted for domestic use, could not possibly be dangerous, and would scarcely be uncomfortable, or that all the moving apparatus near the washer would be boxed-in. The thing simply evolves into a man's problem, like a lot of other things he hasn't anticipated. If the machine is to come at all he will likely have to install it without much encouragement, and then teach his wife to run it afterwards. But if every man skilful in mechanics would spend half the time and interest in teaching his wife to adopt labor-saving machinery in her housework, as he has probably spent some time in teaching her to shoot off a gun, housekeeping would not now be about one hundred years behind farming or any other industry.

The Question of Power

In order to have a complete equipment, it is necessary to have power in some form or other. We can have a lot of labor-savers without power, of course, but it is well to begin now to think about a power system so that plans can be made to make it pay for itself in the work of the farm. Until we can do that, power machinery for the house will come slowly. It is comparatively easy to get a co-operative electric service for the farm in a dairy district, because the power can be turned to account in filling silos and pumping water through the stables, in grinding grain and running cream separators and churns and milking machines. If the farm is out of reach of a co-operative plant, but has a spring on a hill, or a running stream capable of developing even five horse-power, it can have an equally efficient plant of its own. If the farmer does not want to put in a dynamo he can at least have a hydraulic ram or a water-wheel to supply the house with running water and to drive the churn and washing machine. In a flat country where there are no streams with any fall worth considering, we can still have power from a gas or gasoline engine, or even from a windmill. And by some trick of Nature, it so happens in the Province of Ontario, that in most of the districts where we have no hills, we have an unfailing supply of natural gas. So far as natural resources go we are fortunate. The fault is ours if we don't use them.

While the gasoline engine and the co-operative hydro-electric plant are coming along fairly well, there is an immense amount of water-power going to waste on individual farms. The sight of a dozen or more fine young horses running wild on his pastures would strike the average farmer as an awful example of horse-power running to waste. He would likely spend a lot of time and some money if necessary, trying to capture a horse-power or two for his own use. Yet if the same man sees five or ten or twenty horse-power running to waste in the brook that waters his meadows, he isn't at all inspired with a desire to possess and harness that. One water horse-power will furnish light for the average farm. Five water horse-power will furnish light and power, doing the washing and ironing and baking. The cost of installing a plant of five water horse-power (not including the cost of labor) would not exceed about $200, it will work all the time, it will never grow old, and the cost of up-keep is practically nothing. Then if the owner should ever want to sell the farm—to buy another farm, of course—it will make con-

Dishes packed in a dish-washing machine. As the handle works, the fan forces the hot, soapy water over the dishes. Two and a half minutes of operation gives a thorough washing.

siderable difference in the market value to be able to insert in the advertisement: "Hydro-electric plant on the premises, furnishing electricity for light, heat aud power."

Running Water in the House

Now just what will a power system do for women, and what can we have without it? If it were possible to take a vote of all the women of the country as to what improvement is needed first, I think there is no doubt that the decision would be universally in favor of running water in the house. This would begin with a soft-water cistern and a pump plying into a kitchen sink. The next thing would be a system of pipes, a water-front on the kitchen range, and a faucet of hot water, and these would lead directly to a complete bath-room, and the beginning of an equipment of labor-saving machines.

What might be done in the way of fitting a farm house with these conveniences is not nearly so interesting as what has already been done by individual farmers who have adapted a system to suit their own facilities.

To have water under pressure usually necessitates some pumping power. The attic tank and windmill served its day and generation well—is still serving it very efficiently in some places. The only trouble is that we have no guarantee of wind when we want it; it bloweth where it listeth and might not come our way for three or four days at a time, so to insure a constant supply of water the storage tank must be very large, and in a few cases its weight, and an occasional leak, have caused serious damage to the house. Of course the tank and the building can be made proof against this if the owner thinks in time. If the water is piped to the house from an elevated tank outside, care must be taken to make the tank frost-proof. So while it may be more expensive, the compression tank in the cellar is likely to give less trouble.

Where a farm has the advantages of electricity, an electric motor may be installed in the cellar to pump air and water into the compression tank. Up to the present, however, the electric motor has not come into such general use for pumping purposes as the little 1 to 1½ h.p. gasoline engine, and on almost any farm the small portable engine that can be used in either the house or the barn could be made to pay for itself in sawing wood and turning the cream separator and root pulper and grindstone.

Cistern Drains the Barn Roof

Occasionally it is possible to arrange a water system where all the work is done by simple gravity. We have an interesting example of this on a farm in Ontario county, Ontario. To get an ample supply of water for the bath-room, a large cistern was built draining the roof of the barn—a plan worth following on any farm where a large cistern is needed as it drains an area from two to three times as large as the roof of the house. The barn is on a side hill, and the level of the cistern is sufficiently high that the water is forced to the top of the house by gravity. No force pump is necessary at all. A line of pipe is laid from the cistern to the cellar of the house and from there pipes run to the bath-room and the kitchen sink. There

(Continued on page 31.)

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 12.

Hydraulics of Pumps

THERE are many kinds of pumps but it is not within the scope of these articles to discuss them in detail. In Fig. 27 there is illustrated a vertical single-acting reciprocating piston pump. Remarks in regard to this pump may be considered as quite general because reciprocating pumps or those in which a piston or plunger has a back and forth or up and down motion are most common.

As noted in a previous article, the distance XY or that from the source of supply to the piston at the top of its stroke should in practice ordinarily not exceed 25 feet.

The notation to be used is as follows:

L = length in feet of piston stroke.

A = area in square feet of piston or cylinder.

N = strokes per minute.

H = height in feet water is raised above the source of supply.

The larger the suction and delivery pipes, the less the friction, but of course the greater the cost of pipes. Considering both economy and utility the suction and delivery pipes are generally made of a diameter one-half that of the pump cylinder.

For pumps with a 10 or 12-inch stroke it is advisable that the distance travelled by the piston should not exceed 100 feet per minute. On the up stroke of the piston the pump cylinder is filled with water forced up the suction pipe by atmospheric pressure. On the down stroke this water is forced out of the cylinder and, due to the arrangement of the valves, up the delivery pipe. For every complete up and down stroke of the piston there is, therefore, a reversal of the current of water in the cylinder. If the piston travels more than 100 feet per minute these sudden reversals cause loss in energy and may also produce violent shocks.

The discharge for one stroke of a single-acting pump as shown in Fig. 27 is equal to the area of the piston multiplied by the length of the stroke. The discharge in one minute with the notation as given is therefore NAL cubic feet. This amount of water (at 62½ pounds per cubic foot) has been raised H feet and therefore the amount of useful work per minute is 62.5 NALH foot-pounds. To reduce this number of foot-pounds to H.P. (horse-power) divide it by 33,000. To overcome friction in pipes and pump, to set and keep the water in motion and to allow for leakages or slips in pump about twice the theoretic H.P. should be figured on.

An approximate equation for finding the actual H.P. required to raise a certain quantity of water to a given height by means of such a pump as shown in Fig. 27 is therefore as follows:

$$\text{Actual H.P.} = \frac{2 \times 62.5 \times N \times A \times L \times H}{33{,}000} = \frac{N \times A \times L \times H}{264}$$

By applying this formula to a particular case in which a single-acting pump with a piston of 3 inches diameter (area 0.05 sq. ft.) makes 50 strokes per minute of one foot in length it will be found that it would require about one horse-power to raise water 100 feet. The discharge, if the piston and valves were tight, would be 15.6 gallons per minute, and the suction and delivery pipes should be at least 1½ inches in diameter.

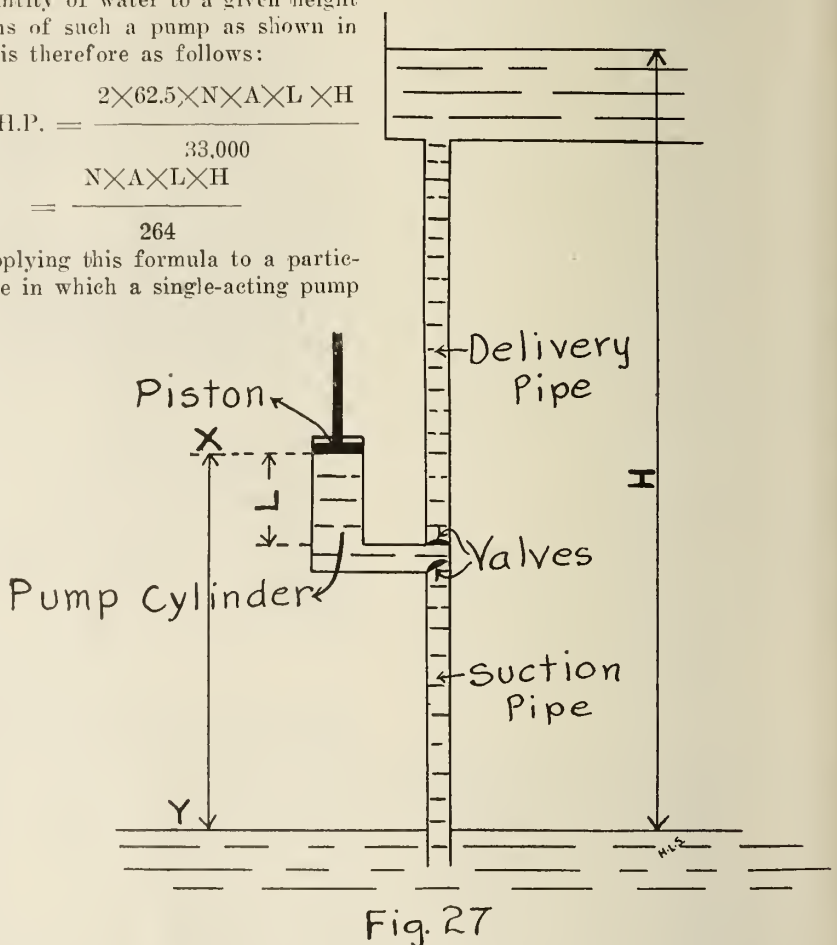

Fig. 27

Water Supplies

The selection, examination and purification of water or water supplies are matters closely related to each other, in which the sanitary engineer is particularly interested. Knowledge, experience and judgment, necessary qualifications for any kind of engineering, are required in these matters. An available source of water supply may on examination prove to be polluted and may therefore cause an alternative supply at greater cost to be selected. If, however, the cost of this alternative supply is deemed excessive or if no alternative supply is available, it may be necessary to use the first-mentioned supply and to treat the water in such a manner that it will be harmless to the consumer.

The Geology of Water Supply

Into the oceans, water is being continually poured by large rivers which are fed by lakes and smaller rivers and streams. These latter bodies are depen-

dent for their water on smaller streams and eventually on the rainfall. As the rain comes from water evaporated from oceans, lakes and other bodies of water, there is evidently a continuous water cycle.

The amount of water available in any lake, river or over any particular area can be, for the purpose of water supply, closely determined by observations or measurements extending, if necessary, over a number of years.

The observations or measurements that might be made in various cases are as follows:

1. Measurements of the amount of water flowing in a stream or river.

2. A determination of the size of the catchment area (an area from which all the water flows into the same outlet.).

3. Measurements of the total amount of rainfall.

4. A determination of the amount of rainfall that runs directly off the surface into streams, etc.

5. A determination of the amount of rainfall that is evaporated.

6. A determination of the amount of rainfall that percolates into the earth.

Lakes, rivers and streams are obvious sources of water supply and are termed surface waters. The water that percolates into the earth is known as ground water and is also a source of water supply. This ground water may flow out of the surface of the ground at some point and is then known as a spring, or it may be necessary to get down to it by sinking wells.

It is necessary to know something of the structure of the earth (geology) to understand how this ground water flows or where it might be expected if a well is to be sunk.

The rocks originally forming the earth's surface were the granites—close grained crystalline rocks. The action of water and weather on these rocks gradually broke some of them up into finer particles and these particles made soil or were deposited as now on the shores and beds of bodies of water (example, sand). The surface of the earth at any point is never at an absolute standstill; it is, very, very slowly, as a rule, rising or sinking. What was once the top of a mountain may now after millions and millions of years be the bottom of an ocean. The action of volcanoes and earthquakes make sudden changes in the earth's surface and deposits of lava are formed. The result of all these changes so briefly stated is that over the original rocks there are generally many different layers of rocks or formations which lie in all sorts of queer positions and not necessarily on the level or horizontally. Some of these layers or formations are sufficiently porous to allow water to flow through them, but some rocks are impervious to water, that is, water cannot flow through them.

Of the crystalline rocks, the granites, syenites and gneisses are practically impervious to water unless there are fissures in the rocks. Of the rocks formed by deposits, the fine grained ones such as clay and shale are generally impervious, but in the coarser grained sandstones and conglomerates and especially in sand or gravel deposits water can more readily flow. As far as the geology of water supply goes rocks or formations can be classed as pervious (through which water can flow) and impervious.

If there are impervious rocks or soil at the surface all the rain water will run off. Fig. 28 illustrates, however, a case of porous or pervious formation. The laws of hydraulics apply to ground water and under the action of gravity the surface of the ground water that percolates into the earth would become a level surface, but the resistance offered even by porous materials is generally so great that a steep gradient is necessary to cause a flow of even low velocity. In sandy soil the ground water often has a velocity of only from 5 to 10 feet per day. Hence the surface of the ground water or water table is curved as shown by the line AB. A well at D would not have to be sunk to the level of the stream A, but only to a point E below the water table.

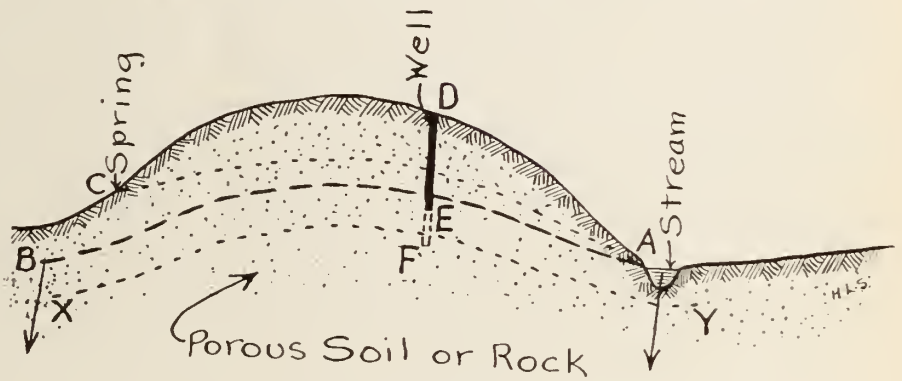

Fig. 28

While the ground water in Fig. 28 is flowing laterally into the stream, it is also moving in a general direction with the stream as indicated by the arrows. In case of a drought the stream might go dry and the water table appear as the line XY and all the flow be underground. This would necessitate the well at D being sunk to a lower point, F.

If there is increased rainfall and hence increased percolation of ground water, the water table might take the position AC and cause an overflow or spring at C.

The usual case is not, as shown in Fig. 28, to find all porous material but rather alternate layers of pervious and impervious rocks or formations. Besides the "shallow" well and the surface or intermittent stream already referred to this latter condition gives rise to what are known as permanent or deep-seated springs and deep and artesian wells, and these will be discussed in the next article.

(Continued in next issue)

WHEN THE GAS ENGINE MISSES AT LOW SPEED

When an engine misses at low speed it is not always the fault of the carburettor, provided the low speed adjustment is correct. In case the operator experiences this trouble, he should first try adjusting the carburettor and if this fails to remedy the trouble, he should look for air leaks between the throttle and cylinder, especially where the intake manifold connects to the cylinder. If the missing is in one cylinder it may be that a valve is sticking or needs grinding, or a gummed piston ring may allow the compression to escape.

Air leaks are sometimes discovered by a hissing sound and many operators mistake it to be in the carburettor. Increasing the richness of the mixture at low speed until all the cylinders fire is not a good practice, because it wastes considerable gasoline and causes carbon deposits. It also makes the cylinders pull unevenly. Each cylinder should produce the same amount of power and the manifold, valves, spark plugs, and ignition timing should be gone over frequently to see that all are in good condition and working properly.

The curiosity of him who wishes to see fully for himself how the dark side of life looks is like that of the man who took a torch into a powder mill to see whether it would really blow up or not.

Dr. O. S. Marden

THE SANITARY ENGINEER

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SEPTEMBER 15, 1915

WITH OUR EXHIBITORS

NEVER before in the history of the sanitary and heating business were there so many manufacturers and supply houses in evidence at the Canadian National Exhibition recently held in Toronto. It showed in a striking manner the great importance of the sanitary and heating industries in Canada.

Without doubt there is no line which has shown such progress of late years as that of sanitary and heating engineering. Such progress is very largely due to the very optimistic spirit shown by our manufacturers. They have invested their capital far ahead of natural demands in fitting their plants up to take care of all demands which may come up, thus ensuring prompt deliveries.

To see so many lines represented at times like these reflects great credit on the manufacturers and should be borne in mind by all buyers of such goods. Those of our readers who visited the Exhibition could not fail to note the great improvements effected in the various exhibits, even during the past twelve months, since the exhibition of 1914.

WHAT OTHER PAPERS ARE DOING

"MACHINERY for Women" is the title of an article appearing in another part of this issue. It shows what is being done by those whose sole labors are devoted to improving the working conditions of the farmer's wife.

Why should a farmer's wife be such a slave to inconveniences? and as the writer of the article says: "If the washing of clothes were suddenly to be put up to the man, all the factories in Canada couldn't supply the demand there would be for washing machines, etc."

This article is reprinted with the purpose of showing the sanitary and heating engineers what is being done by farm papers. All such literature should be taken advantage of by the craft.

Every sanitary and heating engineer who possibly can do so should devote considerable study to the problems involved in country sanitary equipment. To a practical man there is little or nothing out of the common line. Pneumatic water supply systems are to-day almost as perfect as can be desired. Sewage disposal is simple if not too large a system is needed, and if the ground is suitable. In the near future there will be small plants to be had which will cremate all the solids from sewage. This will simplify the disposal of sewage in clay-belted districts. All these things point to the great possibilities for new business for the sanitary and heating trade. Just recently one of the country readers of THE SANITARY ENGINEER paid us a visit and told the writer that he was very busy, and another case came to our notice where a sanitary engineer who never previously had employed more than 4 or 5 men, to-day has 30 men employed, all in the country. In view of the fact that the farmers all over the Dominion have reaped or are reaping an extra good crop, and that farm papers are advocating that the rural residents and farmers should equip their homes with all the city conveniences, the least that the craft can do is to respond right royally.

Give the farmer all that a city home can give him, and he will never hanker after a city home. How many retired farmers are there who have left the farm to end their days in the city? Thousands to our knowledge, and as one who lived in the country for several years, the writer himself can vouch for the truth of the assertion.

The farmer is to-day the best prospective customer for the sanitary engineer, and those who have responded to the call of THE SANITARY ENGINEER have proved the truth of the assertion.

CHOOSING THE BOILER

A CASE was brought to our notice just recently where a person was building a warehouse, which he proposed to heat by steam. He had made several inquiries regarding the merits of various boilers and had finally decided upon the one to be installed. Upon asking for tenders, which specified the boiler required, of those who submitted tenders, all recommended a different boiler, and when asked what objection there was to the boiler specified, none could be given.

The customer was in somewhat of a quandary, but he still decided to insist upon the boiler he had chosen, and to take the responsibility for doing so on himself.

Now, here is a question of very vital importance to every heating engineer engaged in the installation of boilers. In the first place no heating engineer should favor one boiler more than another, unless he can, by practical experience, prove the superiority of the boiler he recommends.

One of the most important branches of a heating engineer's business is to know all that can be learned about every boiler as soon as it is placed upon the market. He should collect particulars and file them so as to be in a position to answer immediately any enquiry concerning it. Every manufacturer of heating boilers publishes a small handbook giving all particulars concerning his own particular manufactures. These handbooks may be made of inestimable service to the sanitary engineer if they are properly filed and kept handy so that they can be found and consulted at any time. But the sanitary engineer who is wise in his generation will do more than this. He will add to the information therein contained the results of his own practical experience with every boiler he installs. An ounce of practical experience is worth a ton of theory, and if, when he makes an installation he will keep track of it for one or two winters, jot down the results, a record of the radiation, size of boiler, construction of the house and all particulars as to how the size of boiler and quantity of radiation was arrived at, if, to complete these data, he can add particulars of the coal consumption, then should a customer ask him for information concerning any boiler of which he has thus had personal knowledge, he will be in a position to give reliable information from his own experience backed up by chapter and verse from his own notes. He could give trustworthy information as to the size of boiler required and also of the probable amount of coal it would consume, besides a variety of other details. Thus would he be fully qualified to render that service which is or should be the aim of every sanitary engineer to render to his clients.

In the event of a new boiler being placed on the market he should make it his business to see one in working condition, gather what information he can and file same until it falls to his lot to make an installation of that type of boiler himself.

It all amounts to this: that when a customer asks for a certain boiler, he should be supplied with the boiler he himself has chosen, or else the heating engineer should have good and sufficient reason to put a strong plea against that particular boiler; but no objections should be made unless there be some very strong, practical reason for such objections.

In the particular case referred to above, the boiler specified in actual fact, was a more expensive boiler and therefore there was more profit in it for the heating engineer than in the others suggested, yet in spite of this, each one of the tenderers tried to sell another in preference. The customer began to have doubts and felt that the heating engineer was really getting more profit out of the lower-priced boiler, and on that account was knocking the higher-priced one.

Nothing is harder to wipe out than suspicion, and the craft have for years been under needless suspicion for no reason in the world.

INSANITARY SEWAGE DISPOSAL SYSTEMS

IN another part of this issue of THE SANITARY ENGINEER, there appears an article under the heading "Sanitary Methods of Sewage Disposal." The article consists of a description of several systems which, while claiming to be sanitary are really not so. We are well aware, as is almost every practical sanitary engineer, that there are many ways of disposing of sewage in a sanitary manner, and no authority, to our knowledge, has ever taken it upon themselves to claim to have found out all about sewage disposal. If it were the case that some one had actually learned of a system which could not be improved upon, large cities would not now be confronted as they are with this most vital and interesting problem.

For instance, every one installing a septic tank which discharges into a system of tile drains should know that there must be sufficient tile pipes laid to take care of the total discharge of the dosing chamber. In fact, it would be well to provide for from 10 to 15 per cent. over and above the actual cubic contents required.

As we state elsewhere, this matter of sewage disposal is too important a subject to be dallied with. These articles referred to bring the matter of a Federal Department of Health to our minds more strongly than ever. Just imagine what such a department could do for the whole Dominion.

Provincial Health Departments are all very well and good in their way, but they are not sufficiently far-reaching, and cannot interfere with the construction of *insanitary sewage* plants in other than their own province. What would work in one province would be very apt to be poor practice in another.

The Canadian National Exhibition

Nearly One Million Persons Visited This Wonderful Exhibition — Greater Interest Being Shown in the Exhibits Than in Years Previous — Splendid Turn Out of Sanitary and Heating Supply Manufacturers.

THE thirty-seventh annual Canadian National Exhibition, recently closed, will never be forgotten by those who visited it. Apart from the interesting relics from the field of battle, which no doubt were viewed with aching hearts by many who saw them, never were so many indications of progress in evidence as there were at this exhibition.

As we pointed out in our issue of a year ago which dealt with the report of the exhibition, events of this nature are intended to show to the world what is being done to improve conditions in every department of social life. The sanitary and heating business has by no means been backward in adding its share to the progressive strides made. Let our readers stop for one moment and look back at things as they were only ten years ago, and in that way try to realize the extent of the improvement made. Ten years ago many lines were just being put upon the market as luxuries; to-day new methods of manufacturing have been adopted which bring all these lines within the reach of the ordinary working man.

The writer well remembers when the cast iron enamelled bath and lavatory were considered a luxury; when to see more than a couple in a store at once betokened superfluity of stock; when to ask a person if they would have nickel-plated traps, waste and overflows installed with their plumbing fixtures would have been considered ridiculous.

We do not credit ourselves or our calling with sufficient importance in these matters. Compare the cost of living, the price of butter, eggs, cheese, bread, meat, clothes, etc., and see how prices stand in the sanitary and heating business. Ten years ago a cast iron enam-

(Continued on page 34.)

View in grounds of Canadian National Exhibition.

JAMES ROBERTSON COMPANY'S EXHIBIT

CONE VALVES—RILEY FIXTURES—CHINA LAVATORIES AND SHOWERS ATTRACT ATTENTION

THE Cone Return Valve was carefully studied by all members of the trade visiting the stand. The explanation of its principles and the positive demonstration of its economy in regulating and stimulating the efficiency of steam-heating plants proved intensely interesting. Many trial orders were placed and opinions expressed that the Cone Return Valve could be used to create business at the present time.

The Riley Fixtures were the subject of favorable comment as regards both material and workmanship, and a number of orders were placed.

There was an excellent display of vitreous china lavatories—as well as some most attractive showers. As one passer-by was heard to observe: "Those showers look so attractive, I wonder more of them are not used. Guess I'll have to get after my plumber and see about putting one in.

Altogether the exhibit was fully up to the standard of previous years—as one friend in the trade remarked: "The Robertson Exhibit always was a complete success."

Remember, too, we own and control some of the largest lead mines in Canada. We specialize upon producing and carry in stock all kinds of lead piping, from $\frac{1}{8}$" to 12" in diameter.

James Robertson Company, Limited Toronto, Ont.

Aylmer Pump & Scale Company

Limited

DRAWING your attention to a photograph of the Aylmer Pump & Scale Co., Ltd., exhibit is like introducing you to an old friend, because they have been selling pumps to the trade for over twenty-five years, and by looking after the interest of the dealer have developed their business until now they are the largest pump manufacturers in Canada.

Their pumps are known from coast to coast and have a reputation for reliability which cannot be surpassed.

After careful investigation and experiments they are now offering the Aylmer Automatic Silent Electric Pump, which has overcome all the difficulties experienced by the manufacturers of Hydro pneumatic pumps.

In introducing the Aylmer Electric and Power Pumps for supplying water under every practical condition we do so with the confidence that the new lines they are offering will live up to the enviable reputation of their company, which is a guarantee of satisfaction to the dealer selling their pumps and the purchaser buying them.

In connection with the department handling their pressure systems they have men associated with them who were among the pioneers introducing this method of water supply in Canada and they assure us that they want the trade to feel free to write them for any information needed involving the solution of problems pertaining to water pressure systems, and they will be only too pleased to give you the benefit of their experience without putting you under any obligation.

They have a full line of Hand Pumps, Power Pumps, Electric Pumps, Ladders, Gasoline Engines, etc., on which you should have information and prices. Write them.

AYLMER PUMP & SCALE COMPANY, Limited

AYLMER, ONTARIO

THE B. O. T. EXHIBIT

IF there was one exhibit more interesting than another at the recent National Exhibition, it was that of The B.O.T. Manufacturing Company. Their display of W.C. Tanks were certainly splendid. All styles of combinations were shown and experts in W.C. "tank philosophy" were in attendance all the time.

This exhibit was not only interesting, but also instructive. One tank had been fitted up with a plate glass front and lighted by electricity in a very novel manner so as to plainly show the actual operation of the valves. These tanks, when arrayed in their respective order, gave one an idea of the large variety manufactured by this progressive company.

Every tank bears a gilt edge, 5-year guarantee, and is fitted up with extra heavy copper lining. The working parts are substantially made and are the best money can buy. The wood is specially treated so that it will not warp or crack, the joints too are of very unique construction, all of which make B.O.T. Manufacturing Company's W.C. tanks not only superior to any tank on the market, but also the finest in appearance.

No piece of furniture can be procured with a finer or better finish than that of the B.O.T. Manufacturing Company's products.

The B-O-T Manufacturing Company, Limited

B-O-T BUILDING

159-161 Richmond Street West, TORONTO

AGENTS: J. H. Leonard, Winnipeg. Thos. Robertson & Co., Ltd., Montreal. Carroll-Wilson Co., Limited, Edmonton. Robertson-Godson Co., Vancouver.

View of the Dominion Radiator Co.'s Exhibit at the C.N.E.

THE Boiler shown on the left is the new SAFFORD-KEWANEE PORTABLE, SMOKELESS DOWN-DRAFT BOILER. These PORTABLE Boilers, both down-draft and straight-draft, have developed a very high efficiency, using the cheaper grades of soft coal.

The next Boiler to the right is the well-known SAFFORD-MOGUL ROUND HOT WATER BOILER.

The SAFFORD MAGAZINE, SELF-FEED DOWN-DRAFT BOILER —The Wonder of the Age—is the next in line. This Boiler maintains an even degree of heat for a period of twenty-four hours on one supply of fuel. It burns the cheaper grades of hard coal, such as PEA.

THE SAFFORD SQUARE-POT SECTIONAL BOILER on the extreme right, in the opinion of all who examined it, will force to the scrap heap all the old-time sectional boilers. When operating this SAFFORD SQUARE-POT BOILER the attendant is no further from the rear of his fire when operating a 6,000-foot boiler than when operating a 1,600-foot boiler.

The SAFFORD-MOGUL—SQUARE POT—SELF-FEED BOILERS—are manufactured by The Dominion Radiator Co. at their Toronto Plant.

Mr. A. L. Macdonald, who was in charge, and who is a past master in managing exhibits, was ably assisted by the Company's travellers.

Dominion Radiator Company, Limited

Head Office and Works: Toronto

Branch Offices: Montreal, Winnipeg and St. John, N. B.

When Moving Time Comes Round

Sanitary Fixtures Found in Bad Order, Traps All Dried Out, Slime Dried Up, Causing Pipes to Partially Choke Up—All Houses Which Have Been Unoccupied for More Than Two Weeks Should be Inspected by Health Department Before Being Re-occupied.

THE average sanitary engineer to date has not taken advantage of half the opportunities which could be utilized to create more work for himself, at the same time rendering great service to the public at large.

The public is made up of owners and tenants, there are only about 5 per cent. who own their own houses, thus 95 per cent. have to move from time to time from one house to another.

In many towns May 1st is moving time, and such being the case there are generally very few houses empty for long periods, but while such is the case in many towns, there are quite a large number of towns where people move at any or all times of the year.

In this case there are generally a large number of houses empty for long periods. The writer was house-hunting for several months and at last was able to secure a house suitable to his taste. Upon looking over the sanitary fixtures, he found every one of the traps dry. The main house trap included. The house had been vacant 4 or 5 months. Upon the fixtures being used it was found that the water did not flow away very quickly. What was the reason?

The slime which adheres to the walls of small waste pipes had dried and curled up, then peeled off when water was poured down the pipe resulting in a partial chokage. The atmosphere in the house was vile, and it took a week before it was fit to live in. All this foul odor, however, was not due to sewer gas or odors by any means, but to some extent because of the house being generally dirty all through.

Now, here comes an opportunity for the santiary engineer.

It is a well-known fact that of all fixtures in a house which get the most use, as well as abuse, the sanitary fixtures, and the furnace are the chief.

Such being the case there should be a compulsory inspection of all such fixtures before a new tenant takes over a house. Such an inspection would be a boon to both owner and tenant. Most leases demand that tenants shall take reasonable care, wear and tear excepted, of all sanitary fixtures, piping, etc., and, again if inspection were made, say as soon as a house is vacated, the fixtures found to be O.K., then the inspector could instruct the owners what should be done to prevent traps from becoming dry, or if the fixtures were found to be out of order, then they should be put into good repair and passed by the inspector. This would safeguard the interests of both the owner and the incoming tenant. Very few tenants can get an owner to spend money on a house at the start, expenses are the first consideration in the eyes of the owner. The question of the health of a tenant is no consideration whatever. Such being the case, it is the bounden duty of the health department of every city to see that sanitary fixtures, as well as the house in general is in good order before a new tenant be allowed to take possesion.

While we are discussing this question, it would be well to dwell a little upon the final test and inspection of all new buildings. Most Canadian plumbing by-laws demand both a water and smoke test. The former test is simply a test of the roughing in, the latter is chiefly a test of the trap seals and fixtures. How often is this test enforced? Very seldom, and what is the result? Fixtures are installed in many instances in a shocking manner. Poor connections are made between the lead bend and the w.c.; blind washers are put into the trap vent; and a score and one faked jobs are put over the innocent public. These assertions may seem a little hard, but they are true, and those who are doing such work get away with it somehow. Why? Because they are not in sympathy with sanitary matters in the least, all they care for is the mere dollars and cents. These men never strive for new up-to-date sanitary regulations, never become members of their association, very seldom take a pride in their work, and while making a few dollars for themselves, are bringing disrepute upon those conscientious men who are doing the right thing.

Not very long ago the writer stepped into a new apartment house as the fixtures were being installed, and out of 4 of the bathrooms being fitted up, 3 of the lead bends had been roughed in 3 inches too short on the vertical piece, and a short piece of 4 inch lead waste pipe was slipped downward into the lead bend just long enough to prevent the water from leaking through. Then from below there was paint and putty wiped over. In 9 cases out of 10, such work would be detected, if a final test were made. Further, the plumbing inspector should be instructed to make impromptu visits upon all jobs under construction, such a rule would make men do the right thing, and if work were found to be of a poor class, the license of the man doing the work should be suspended. Before any new building or house containing any fixtures connected to either septic tank or sewer is occupied a final smoke, air or peppermint test should be put on those fixtures, and a final certificate granted to show that all the plumbing has received the approval of the board of health.

WILL PAY EMPLOYEES WHO JOIN THE COLORS

The Imperial Oil Company, Limited, of Toronto, has addressed the following letter to all its employees:—

"The directors of the Imperial Oil Company, Limited, have decided to pay all employees who have enlisted, or who may enlist, with the Canadian contingent for overseas service, in the case of married men half pay and in the case of single men quarter pay, until the end of the war, and, in addition, will hold the positions open.

"Should any employee who is serving with the colors meet with a fatality in the course of the war, the directors will continue the payment, in the case of a married man, of half pay to his wife or immediate family for six months after his death, and in the case of a single man one-quarter of his salary to his dependents (if any) for six months after his death.

"The above applies to all regular members of the staff who were in the service of the company for at least six months immediately preceding the declaration of war."

STARTING BUSINESS

A new plumbing, tinsmithing and steam fitting establishment has been opened in Cornwall, Ont., by Mr. E. O. Poirier, a young man who is well and popularly known in Cornwall. He is an expert mechanic and guarantees to carry out all work entrusted to him with entire satisfaction. His shop is at the corner of Marlborough and Water streets.

Practical Course for Sheet Metal Workers

ARTICLE No. 22 OF SERIES

By CHARLES SEIVERS

In Figs. 1 and 2 are show a tee and branch between pipes of different diameter. It will be noted that the branches are not run directly off the centre of the main pipe or on the outer edge, but come more on one side of the large pipe than on the other, thus requiring that the cutting line or junction be outlined completely around branch. In each case the portion of cut facing on drawing is drawn with heavy line, while portion on opposite half is drawn with light broken line.

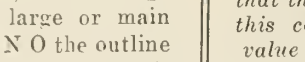
In Fig. 1 let the outline A B C D E F G H be the elevation of tee, and the large circle K the section of large or main pipe, and the outline L M N O the outline of small pipe placed in its required position over the main. To develop cutting line of C D, draw a half-section of pipe, and divide it into a number of equal parts. From these points and at right angles to C D, draw lines through C D, extending them past B E. Next draw a half-section on L M, and divide into same number of equal parts as half-section on C D. At right angles to L M, draw lines from each of these points, extending them until they intersect the circumference of circle K. Parallel with A F draw lines from each of the points on large circle, formed by the lines drawn from half-section, extending them until they intersect corresponding line drawn from section on line C D. A line drawn through these points will give outline of intersection between the pipes.

This is Article 22 of a series of practical problems for sheet metal workers, prepared by a practical man especially for the readers of The Sanitary Engineer. Those conducting tinshops have told us that they and their men have found this course to be of inestimable value to them.—EDITOR.

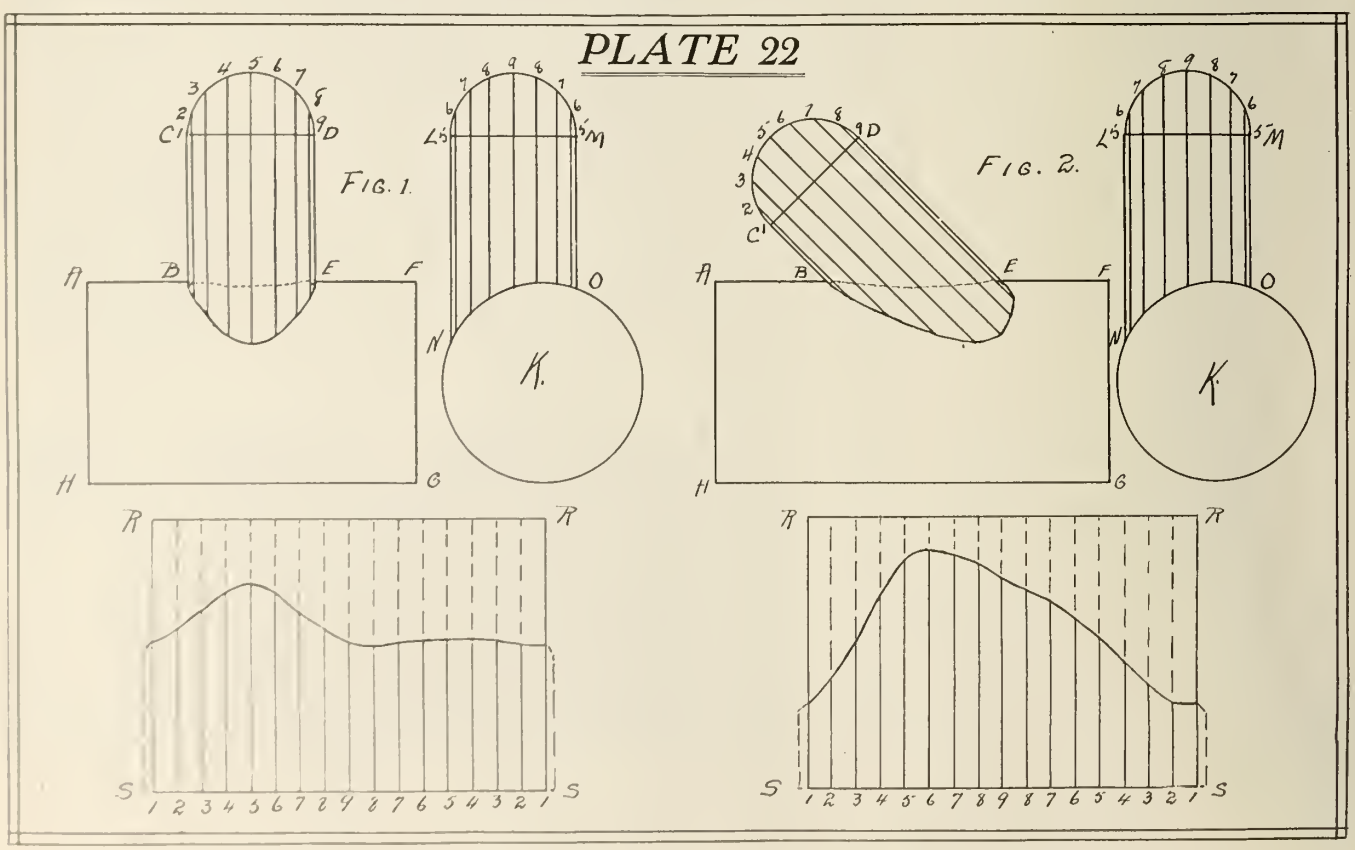
To develop the pattern, draw two parallel stretched lines, as R R and S S at one end, and draw a line at right angles connecting R R S S, as shown at R S R S. From these points set off the divisions on half section, repeating to make circumference complete.

With the compasses measure from the line C D on each of the lines drawn from points in half-section to their intersection at cutting line. Commencing at C, or space 1, and set off from line S S , measure in same manner lines 2 3 4 5 6 7 8 9 from line 9. Work back on lines 8 7 6 5 4 3 2 and 1, measuring to the light or dotted line representing rear half of cut, and set off from line S S in same manner. A line drawn through points thus obtained will give outline of pattern required.

The development of Fig. 2 is carried out in a similar manner.



It seems to be thought necessary in some plants to have long lists of arbitrary rules for the government of employees. As conditions and the character of the workmen vary so much, it is difficult to say how far the matter should be carried. I believe that rules should be as few and simple as is consistent with necessary discipline. The personality of the foreman carries much more weight than rules.



Analysis of Canadian Plumbing Bylaws

Proposed New Plumbing By-law for Montreal—Many Clauses Not Only Ridiculous, But Impracticable, Proving That Sanitary Engineers Should be Consulted in Such Matters—The Sanitary Engineer Takes Full Responsibility for the Criticism Published in This Series of Articles.

ARTICLE 3.

Clean-outs

Section 615.—Heavy, brass male-threaded clean-outs of at least three-sixteenths inch (3-16 in.) thickness, the cover of which shall have a solid cast square head of one and one-half inches (1½ in.) square and one inch (1 in.) in height, shall be placed at the ends of each horizontal line of drains and of contributory laterals of five feet (5 ft.) or longer.

As far as this clause goes it is not out of the way, except where it allows the clean-outs to be placed at the ends of each horizontal line of drains and of contributory laterals of 5 feet or longer.

The Sanitary Engineer maintains that there should be a clean-out placed every 25 or 30 feet at least, and these should he brought to the surface of the ground or floor. To allow any indefinite length, 5 feet or longer, would, we think, be very poor practice. It will be noted that this clause demands an all-brass clean-out. There should be no objection to a well-designed cast iron body clean-out with brass cover.

Cast Iron Clean-outs

Section 616.—The body part of clean-outs may be of extra heavy cast iron, provided they have a brass cover three-sixteenths of an inch (3-16 in.) in thickness with a solid cast square head of one and one-half inches (1½ in.) square and one inch (1 in.) in height.

Clean-outs to Be Accessible

Section 617.—Every clean-out shall be of the same size as the pipe it serves and it shall be placed so as to be accessible.

It will be seen that while section 615 demands an all-brass clean-out, section 616 allows an iron body clean-out.

This is one of the proofs that practical men should have been consulted in the compiling of this by-law. Then quite a number of useless sections could have been eliminated. Section 617 could easily have been embodied in either 615 or 616.

Soil and Waste Pipes

Section 618.—Every soil and waste pipe shall be of cast iron or of galvanized wrought iron except for branch waste pipes less than five feet (5 ft.) in length, which may be of lead when used to connect with cast or wrought iron. The lead piping shall intersect as given by 1-16, ⅛ or 1-6 bends or by Y branches.

Pipes to Be Securely Fastened

Section 619.—All pipes not bedded in the earth shall be securely fastened into position by permanent metal fasteners.

Size of Soil Pipes

Section 620.—It is forbidden to have a soil pipe of a less inside diameter than four inches (4 in.).

Change of Course in Sewers

Section 621. — When galvanized wrought iron pipe is used for sewer, drain, soil, waste or down pipes, all changes of direction shall be made with one-sixteenth (1-16), ⅛ or 1-6 bends or Y branches threaded in the inside and so constructed as to form a bore uniform with the pipe without any burrs or recesses. All fittings shall be galvanized malleable iron or galvanized cast iron, or cast iron dipped in hot tar.

We have no fault to find with Sections 618, 619 or 620, but in Section 621 we do not agree with the last paragraph where the dipping of all cast iron fittings with tar is demanded.

Vertical or horizontal cast iron soil or waste pipes and fittings should be dipped in oil merely as a prevention against rust, providing these pipes are not covered with earth.

But where such pipes are buried underground they should be treated with hot tar.

There are two reasons why cast iron soil and waste pipes which are not buried underground should not be tarred: one is that defective pipes can thereby be made to stand the tests demanded; the other is that such piping exposed is very often given a coat or two of paint, so as to make it look neater when the house is decorated and painted, and a tarred pipe cannot be painted except after several coats of shellac have been applied.

Openings in Drains

Section 622.—It is forbidden to make any openings in the drainage system of any building unless the opening is properly trapped and supplied with water from a suitable fixture. All surface drain shall be of cast iron with a suitable strainer grating.

We do not think any drain should be broken into or trap inserted of any kind, or for any purpose, without a proper permit being granted, and full particulars should be furnished upon which the granting of a permit should be based. Such a section would allow any person to break into a drain or sewer and install just what he pleased, unless the health department were first notified of the work being done.

Bell Traps

Section 623.—It is forbidden to use bell traps.

Exhaust Steam Pipe Connecting with Drains

Section 624.—It is forbidden to connect an exhaust steam pipe with any drainage system. The exhaust steam shall be discharged into a condenser, which may in turn discharge into the drainage system.

Section 623 is short but to the point. It is one which should be embodied in every by-law, and it is to be regretted that the city of Toronto as well as several small towns allow the use of bell traps.

Section 624 should be in every by-law, but is not, we are sorry to say. Many a manhole in several localities can be seen at times belching out large quantities of steam.

It is strange that such is the case, because it costs money to generate steam, and if a steam plant is up to date, no steam will be allowed to enter a sewer nor even the condensation, as this should in some way be made to return to the boiler.

(Continued in next issue)

Berlin, Ont., to Have Two New Boilers

Arrangements have been made for the installation of two new boilers for the Central Heating Co.'s plant. The boilers will be ready shortly, and are of the Babcock & Wilcox type with 300 horsepower capacity each. Mr. Thompson stated that the customers of the company can now rest assured that they will get the best of service during the winter months.

New Sanitary and Heating Goods

NEW TAP WASHERS.

Every sanitary engineer if he be progressive, hails with delight any or all improvements which happen to be made from time to time.

The troubles with washers is one which has been experienced by all in the trade and there no doubt has been very little improvement made for some time past of a radical nature.

The Baker Specialty & Supply Co., Logansport, Indiana, have, however, gotten off the beaten track by putting on the market a brass re-inforced washer, illustration of which appears below, the bushing is not simply a brass disc embedded in rubber, but is also perforated

New Tap Washers.

at points so as to make the washer and brass one amalgamated whole. These holes prevent the rubber from separating from the brass. Further particulars as to sizes, prices, etc., may be procured from the above address.

NEW BULLETINS AND FOLDERS

The Ontario Wind Engine and Pump Co., Ltd., Toronto, have issued several new bulletins describing their new line of pneumatic water service systems. They are well gotten up and will prove interesting to those who install country residence equipments.

Saving Fuel

Above is the title of a very interesting booklet, describing the various uses to which Nonpareil insulating bricks can be put. As this is the time when heating engineers are doing all kinds of repairs to heating systems, such a booklet will prove of value, and may be had upon application to Armstrong Cork and Insulating Co., Ltd., 214 East King Street, Toronto.

Syphon for Septic Tanks

A new syphon is described on a folder recently issued by the West Toronto Foundry Co., Mulock Avenue, Toronto. Those installing septic tanks will no doubt be interested in the contents, and may procure all particulars free on application to the above address.

A New Thermostat

The latest gas controlling thermostat to be placed upon the market is that of The Jarvis. It is being handled by the Consumers' Gas Co., Toronto; Gurney Foundry Co., Ltd., Toronto, and the Moffat Stove Co., Ltd., Weston, Ont. Further particulars may be procured by writing to above named firms.

A Sharp Cut

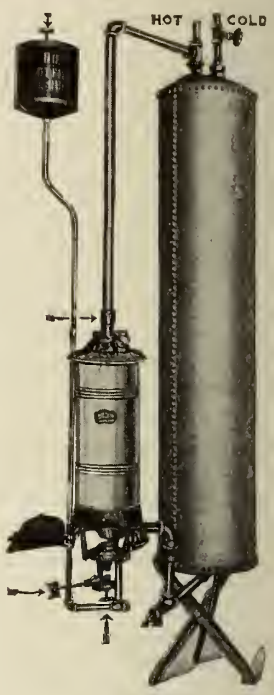
Above is the title of a new booklet just out by Gurney Foundry Co., Ltd., Toronto, which describes their latest smokeless boiler. It is well gotten up, and contains some very interesting data, and can be procured free upon writing above company.

The Aylmer Pump Company, Ltd., Aylmer, Ont., have just issued a new series of folders describing a new line of hydro pneumatic pump. They are highly illustrated and will be furnished free upon application.

The Pease Foundry Co., Ltd., Toronto, have issued a new booklet which contains full particulars of their new "Ideal" smokeless down-draft boiler. It also contains other very useful data for the heating engineer, and may be had upon applying for same to above address.

NEW GAS WATER HEATER

No home is complete unless facilities are provided for furnishing a good supply of hot water on short notice. No bathroom can be defined as being modern or complete unless there is some means of furnishing hot water for a bath in a few moments. In most country homes where neither natural or artificial gas can be procured, to obtain water for bathroom use it was at one time necessary to light the range, heat up practically the whole house, and wait patiently from one to two hours before sufficient water could be had. Such conditions, however, have passed away with the advent of gasoline water heaters, and the most recent one to be placed on the market is one known as "The Hotstream." Not only is this gas water heater constructed to use gasoline for fuel, but natural or artificial gas can be used; all that is required to change from gas to gasoline is the burner. Then to use artificial gas, the burner is the same as that used for natural gas, except changing the spud, or orifice through which the gas flows. Further particulars about this line of gas water heaters may be procured by writing to



New Gas Water Heater.

the Hotstream Heater Co., Cleveland, Ohio.

STEEL AND RADIATION REORGANIZES STAFF

Owing to the above concern receiving such a large amount of war orders of various kinds, and also to the fact of Mr. R. J. Cluff severing his connection as general manager to take over other interests, as well as W. S. Howard, the sales manager, having received another appointment, it was felt that a thorough reorganization would facilitate matters and assist the concern considerably to cope with all increased demands.

The following are the new officers appointed:—General managing director, H. H. Macrae; assistant managing director, T. R. S. Case; controller and secretary, F. J. Mayo; general sales manager, W. A. Cooke; assistant sales manager, H. O. Morris; chief heating engineer, Jas. Wilson.

The pay envelope and the occasional word of commendation are powerful tools for a persistent sequence of growth toward a better business.

Sanitary Methods of Sewage Disposal

This Series Will Deal With the Sanitary Methods of Sewage Disposal in Rural Districts, Where There are no Drainage Systems—Even Large Cities are Realizing That Sewers and Drainage Systems are not by any Means Disposal Systems.

IN several preceding issues the problem of sanitary sewage disposal systems for farm and country homes has been dealt with. Several other trade papers have also of late described sewage disposal tanks or methods, which,apparently, would conflict with those described from time to time in The Sanitary Engineer.

We feel that this subject should be dealt with in a more serious manner than has been adopted hy the papers in mind. Viz. Contract Record and Canadian Hardware Journal.

Fig. 1 shows a septic tank which appeared in "Contract Record" April 28th, 1915, page 468. The article deserihing the septic tank is alright as far as the introduction to the subject goes, but when describing the actual working of a septic tank the size and amount of field tile needed is altogether misleading. The size of soil pipe from the house to the septic tank is also a size to large, in fact, if tile pipe were laid, the size recommended viz., 5 inch could not be procured.

Speaking of the capacity of this tank the writer of the article says:

> *"Illustration No. 1 shows a good type of tank for handling the sewage for a family of five and having a capacity of 350 gallons per day."*

Now, the capacity of a tank is proved hy the amount of sewage which will be flushed out of the dosing chamber or, the flush tank. It will be seen that this particular tank is shown as being 9 feet 8 inches long. 4 feet wide and the depth of sewage is given as 1 foot 3 inches. Therefore it holds approximately 270 gallons and not 350 as claimed.

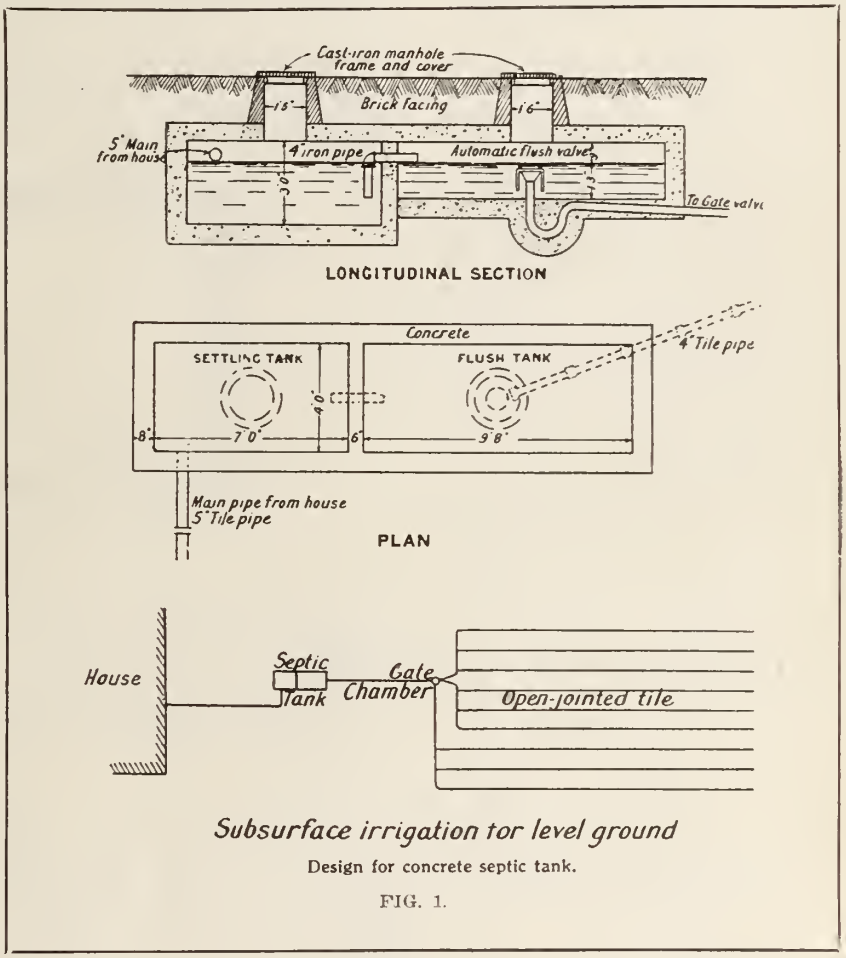
Next it will be remembered 350 gallons is spoken of as being the quantity of sewage discharged from a house in which a family of 5 resides, providing there were an error in calculation and that we take the actual capacity viz. 270 gallons as being the quantity allowed from a house with a family of 5 desiding, this would be allowing 54 gallons a day per person.

Such a quantity would be altogether beyond the necessary proportion. The Sanitary Engineer would never advocate such a quantity, having found from practical experience that from 15 to 25 gallons is ample. Let us just analyse what such a quantity as 54 gallons per person would mean.

It would mean one and one-half barrels of water per day, just imagine a farmer having to pump 270 gallons of water daily, where no power could be obtained. For an ordinary pneumatic system it would mean one hour's steady pumping, more or less, according to the size of pump and capacity of tank. This latter question of pumping of course would not require to be considered, but it will be observed that 270 is too much to allow for 5 persons.

The article in question then goes on to state, when referring to the sub-surface disposal bed:—

> *"To secure sub-surface disposal, 3-inch agricultural drain-tile are laid with open joints, the bottom of the tile coming within twelve inches of the surface of the ground. The drains should be laid with a slight fall, say two inches per 100 feet. The ground should be, naturally or artificially, so well drained that water will descend through it readily.*
>
> *"In a country with as severe a climate as parts of Canada, where frost will affect the ground to a depth of four or five feet, it would be necessary to cover the surface of the ground above the tile with straw, leaves, or other kinds of mulch in order to prevent the frost affecting it. The superficial area of the disposal plant outlined above would not be greater than 40 feet by 100 feet.*
>
> *"Illustration No. 2 shows a sub-surface system adapted to level ground. The tile lines are divided into three series leading from the gate chamber, so that the ground utilized by two lines is given a complete rest while the other is in use. The length of tile required will depend upon the porosity of the soil. For a porous soil, one foot of tile for each gallon of sewage should dispose of the liquid; for clay there should be at least three feet of tile per gallon."*



Subsurface irrigation for level ground

Design for concrete septic tank.

FIG. 1.

With the first paragraph we have little fault to find except that it is advised to use 3 inch tile pipe. We do not recommend anything less than 4 inch, because of the larger area of such a pipe

and where the ground is porous and suitable the use of 4 inch pipe will do away with almost half as much digging as would 3 inch.

The second photograph quoted says, "It would be necessary to cover the surface with straw, leaves or other kind of mulch, etc."

The Sanitary Engineer never heard of such a thing as having to cover the ground to prevent it from freezing. It does not require any such precaution, but rather the reverse. No ground is in danger of freezing, providing the proper proportions of tile, etc., have been allowed. There is a greater danger of freezing if the pipes are laid lower than 12 inches, because the bacteria are not able to procure a sufficient quantity of oxygen to allow them to work. This type of bacteria must have a sufficient supply of oxygen; failing this, they would die and there the ground would then freeze.

The next paragraph speaks of the amount of tile pipe required as being "One foot of tile for each gallon of sewage where the soil is porous." Our readers will note that 3 inch pipe was recommended. This being the case, one foot per gallon would be altogether out of the question, the duty of the field tile pipe is to hold the full contents of fluid flushed at one time, which means, the total capacity of the dosing chamber or flush tank. It will therefore be seen that instead of one foot of 3 inch pipe, it would actually require 2 feet of 4 inch field tile pipe. What would happen if, say, a syphon was in operation and only half of the contents could get out of the tank because of having nowhere to flush into? And that is what it amounts to when there is not sufficient pipe laid to take all the liquid at one flushing.

This article speaks of allowing 3 feet of 3 inch tile pipe if the ground is clay. As a matter of fact, if the ground is pure clay it is not suitable for a sewage disposal bed, and should not be used. An artificial bed should be laid, and a series of under-drains laid in the clay about a foot deeper than the artificial bed. This latter being at least 2 feet deep of good loamy earth.

Fig. 2 shows a tank which appeared in the "Canadian Hardware Journal" December 1914 issue, and which was brought to our notice, "because of its simplicity." This article shows how the tank should be built, and calls it a "Septic Tank" when it is nothing more nor less than a cesspool with two compartments. It is so utterly ridiculous that we need only quote the paragraphs which refer to the work which this tank is to do, the size, and the depth it is to be buried.

"The principles upon which the concrete septic tank operates is extremely interesting. It consists of a long watertight cistern, through which the sewage passes very slowly and evenly. Located underground, it is warm and dark, thus affording perfect conditions for the development of the bacteria or germs which clarify and render harmless the sewage. After passing through the septic tank the sewage is practically free from all suspended matter and has the appearance of water. From the septic tank this clear effluent is discharged into three lines of ordinary farm drain tile.

LOCATION OF TANK.

"While the odor from a septic tank is scarcely noticeable, it is nevertheless best to locate it at some distance from the house. Choose a spot easy to excavate so that the top of the tank can be sunk below the frost line and where the lines of drain tile will have sufficient fall to carry off the discharged fluid. The tank should be large enough to hold the entire sewage for one day. For a family of eight to ten persons occupying a house having two bathrooms fitted with the customary appliances in the way of tubs and stationary wash stands, and, downstairs, the kitchen sink, a concrete tank having two compartments, each 4 feet long by 4 feet wide and 4 feet high will be required. The walls of the tank are 8 inches thick, the top and bottom 4 inches thick and the partition between the two compartments 6 inches. Therefore, the length of the pit should be 9 feet 10 inches and the width 5 feet 4 inches."

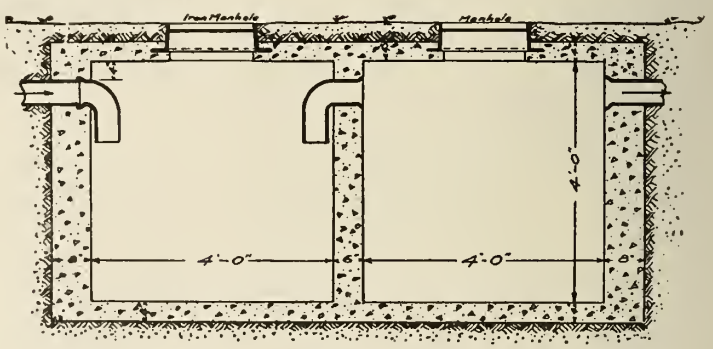


Fig. 2.—Cross section indicating location of pipes.

Just imagine some misguided person having such a death trap constructed, and at the same time living with the idea that he has built something very superior to the ordinary trench cesspool. The fact of the matter is, one of the latter would be much more desirable. Of course neither is at all sanitary, but rather the opposite. The reason we are condemning such installations is simply to warn the inexperienced person from being advised to undertake such work, which they know nothing whatever about on the one hand and on the other hand to show our readers something which they should warn their customers against installing.

All such matters are of too important a nature, to be handled by inexperienced persons. They are matters which our provincial board of health should have a say in. No province in the Dominion should allow such death traps to be installed, and to prevent them, there should without doubt be a Federal Department of Health.

This article to which we have referred so far goes on to state that after the tank is made.

"The inlet pipe is then connected to the pipe from the house and the outlet pipe joined to three lines of 3-inch concrete drain tile. The drain tile will be laid below the frost line and the joints left open, that is to say, no mortar must be used in the joints. This permits the discharged fluids to be absorbed by the surrounding soil.

"The drain tile lines should be laid in the form of the letter "Y" and sufficiently extended to cover a large area of ground. Average conditions require that each arm be about 100 feet long.

"After this is done, cover the tank with earth to the level of the manhole covers. It is now ready for use."

We cannot refrain from calling our reader's attention to such a dangerous installation, a costly one too. The digging to be done would alone cost 10 times more than a properly installed septic tank. For instance the tank needs a hole anyway from 8 to 10 feet deep, according to the depth which the frost will go. Then 3 lines of pipe 100 feet long would need to be buried in trenches from 4 to 6 feet deep. No bacteria could exist at such a depth. We wish our readers to compare these articles referred to with those which have appeared recently in The Sanitary Engineer and which have the endorsation of the very highest authorities throughout the Dominion, because of their being based upon the very best practical experiences and experiments.

In concluding this series, let us remind our readers that in scarcely two cases are conditions alike; that every case has some particular feature of its own to overcome; and that no one plan is sure to give satisfactory results in every instance. What is required is a little good sound judgment, a little care and thought given to each case.

There are farm papers, as well as

trade papers, who think, if they can show a farmer how to install his own septic tank that they are doing a great thing. The fact is they would be better serving the farmer if they would show him how to grow wheat, raise hogs, chickens, etc., in a more profitable manner, instead of urging him to become nothing more nor less than a jack-of-all-trades.

What would the readers of The Sanitary Engineer think if its editors were to begin to try to show the sanitary and heating engineer how to raise his poultry, to lay eggs or grow his own potatoes on a near-by vacant lot in his spare time, so as to dispense with the farmers' products. One professor of agricultural science recently wrote an article on a septic tank disposal system, and, in speaking of the tile laterals, said:

> These laterals. . . should not be laid on a sloping place . . . 150 to 200 feet of 4-inch pipe would be required (for a discharge of approximately 21 cubic feet of sewage).

It will be seen from this that the writer knew very little about the subject. Any man who had had any practical experience would have specified not less than 13 lineal feet of 4-inch tile pipe to every cubic foot of sewage to be discharged, thus bringing the quantity of piping from 273 to 300 feet in this instance. Referring also to the statement that laterals should not be laid on sloping ground, this is incorrect. We have shown how to lay laterals on sloping ground.

If it were not possible, the rural resident would have to make up artificial beds to enable him to install a septic tank.

THE VALUE OF THE SMOKELESS BOILER

(Continued from page 11.)

that 90 per cent. of these deaths occurred in towns where coal fuel was used to generate power and heat.

Tests taken some time ago in Philadelphia proved this.

In the City of London, England, it is estimated that over 76,000 tons of soot is deposited on streets, roads, buildings, and is cleaned from boilers and chimneys. This results in a loss of light in that city to the extent of over 40 per cent.

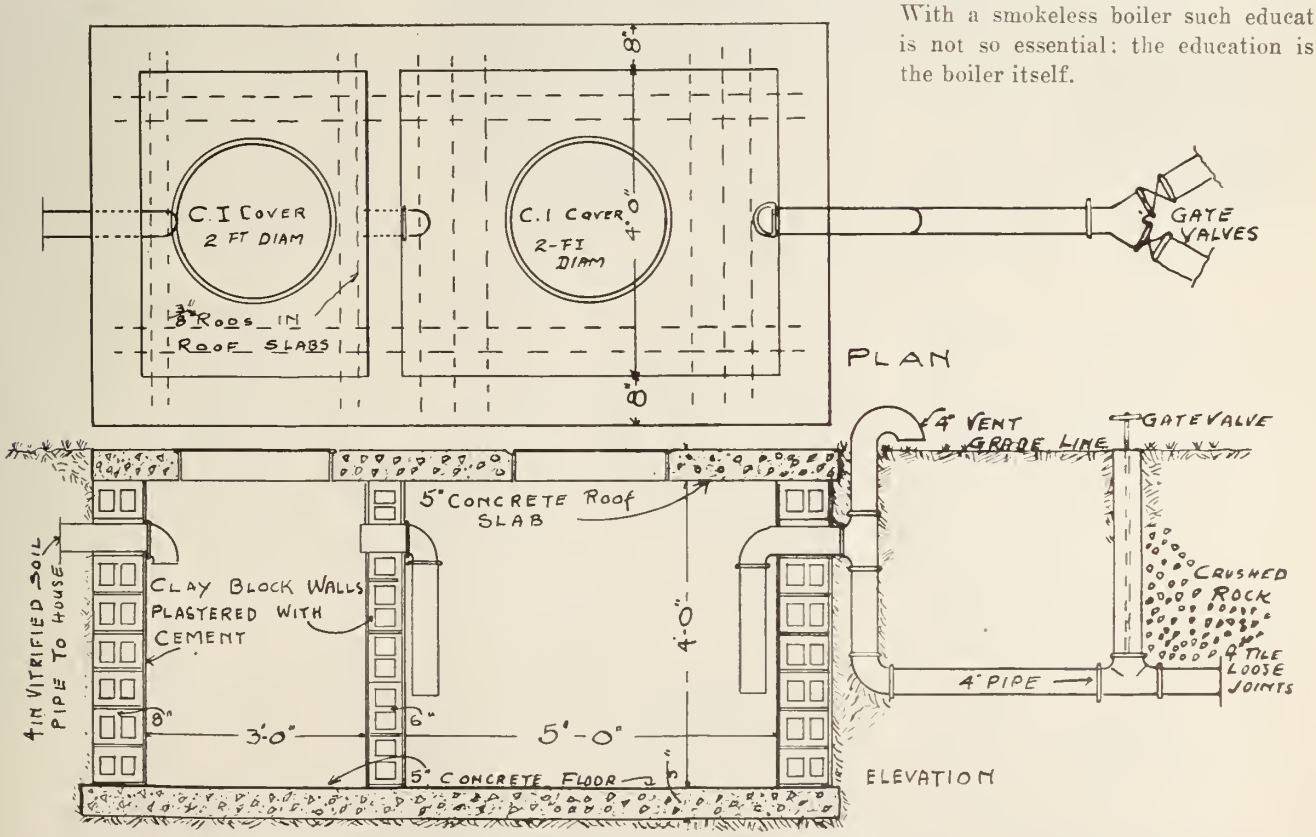
It is estimated that smoke deprives London and Pittsburg of almost half the possible sunlight in the winter and one-sixth in the summer. Smoke in Pittsburg alone has caused, and is causing, a direct loss of over $4,000,000 per year to the manufacturers of that city.

It is estimated that to furnish heat for every individual in Canada it costs approximately $16 per year. Basing the population at 8,000,000, this gives the total cost at $120,000,000 for coal. This, of course, only applies to the coal consumed in furnaces. To be very conservative not one cent less than 40 per cent. of this amount of money goes up in unnecessary smoke. Add to this the loss of life, damage to buildings, extra labor, etc., and without doubt the figure must be doubled.

Now, as we all know there have been scores of fuel economizers, patent grates, and all kinds of smoke consumers put upon the market, 90 per cent. of which have proved to be failures. They were tried and tried, but all to no purpose, and the result is that engineers could see very plainly that what was required was a boiler that would bring about perfect combustion. These requirements are being met to-day by the smokeless boilers.

If the public are only made to see that the first cost is the last, that by buying a smokeless boiler they can help to save at least one-third of their coal bill, their use will become universal. No boiler ever built in days gone by had anything like the selling points of several smokeless boilers at present being put on the market, and wherever a heating engineer knows of a boiler which is not giving every satisfaction, there he should demonstrate the good points of a smokeless boiler.

No doubt a great deal of fuel can be saved by proper firing, but what does it cost to educate every person in a house in the art of properly firing a furnace? With a smokeless boiler such education is not so essential: the education is in the boiler itself.



Plan and elevation of tank sent in to the Sanitary Engineer office, with a claim that it can be made without the aid of a plumber, also that it is perfect in construction.

COMMENCES BUSINESS

R. McArthur, who has for several years been in the employ of W. F. Michus, at Preston, and who installed the heating and plumbing in the Town Hall, has decided to go into business for himself in Hespeler.

NO NEED FOR SEWAGE ODORS

That there was no need for sewage odors was the statement made by G. W. Fuller, consulting sanitary engineer of New York, in addressing the opening session of the fourth annual congress of the Canadian Public Health Association at the Academy of Medicine recently. He read a paper on "Modern Methods of Sewage Disposal." He told of the "activated sludge system," which consists in blowing air through sewage sludge for a month or two until the sludge in the presence of oxygen has developed on its surface certain bacteria which brings about a reduction of soluble organic matters. At Milwaukee the plan has proved a decided success so far. Mr. Fuller remarked that the problem of odors in regard to sewage disposal was simply one of proper treatment.

Editor's Note.—The method spoken of will be described in the next issue of the Sanitary Engineer, and no doubt will be of great interest.

MANUFACTURERS PLEASE NOTE

The Sydney office of H. M. Trade Commissioner for Australia has forwarded a list of importers in Queensland who have formerly bought from foreign firms but who now desire to get into touch with United Kingdom manufacturers of the particular classes of goods in which they are severally interested. In most cases these firms desire that, in the first instance, samples and quotations should be submitted to their buying agents in London. The following are amongst the goods which are dealt in by the firms mentioned in the list:

Metals and Metal Goods.—Enamelled ware, gas fittings, pipes and tubes, lamps and lampware, lawn mowers, lifting jacks, motor horns and pumps, rails, stoves and ranges, tinware, tools, magnetic wire and zinc sheets.

The above-mentioned list of importers, together with the names and addresses of the buying agents in London of the various firms, may be consulted by United Kingdom manufacturers of the goods mentioned at the Commercial Intelligence Branch of the Board of Trade, 73 Basinghall Street, London, E.C. Any further communications on the subject should be addressed to H.M. Trade Commissioner for Australia, 81 Pitt St., Sydney, N.S.W.

INSPECTION OF PLUMBING IS THOUGHT WISE

As a preparatory step before having a plumbing inspector appointed in Chatham, the local Board of Health will first secure copies of plumbing by-laws in force in other places in the province, and from these and other information will draft a by-law suitable for this city. Then later it is expected that an inspector will be appointed by the City Council to supervise the installation of all plumbing in the city. The matter was lately dealt with at the meeting of the Board of Health.

Mr. Coyle, sanitary and heating engineer, raised the question of having a plumbing inspector appointed.

"Apparently the council does not wish to take action in this respect," Mr. Coyle stated. "I have learned that some of the members of the council had expressed the opinion that the board should first adopt a plumbing by-law and present it to the council before the appointment of an inspector." Mr. Coyle moved that the secretary communicate with various places of the size of Chatham and secure copies of the by-laws. Later the by-laws could be amended to suit local conditions. The motion was seconded by J. C. Wanless and carried.

"MADE IN GERMANY"

The German manufacturer is second to none in astuteness. A prominent American importer who has very extensive business relations with Germany positively states that the Berlin Government is secretly encouraging German manufacturing concerns to remove from their goods the famous trade mark "Made in Germany."

A great variety of once popular German products, he declares, are being sent to factories leased by Germany in neutral countries where they are stamped with neutral trade marks before exportation to various countries! The "Daily Telegraph" says that this information is corroborated by reputable importing houses in New York. The German officials are beginning to realize the commercial isolation of Germany. Many goods now coming into the country stamped with the marks of Holland, Switzerland, or Denmark, another authority declares, are really made in Germany, but so much secrecy has been maintained that it is doubtful if the governments of these neutrals themselves are aware of the fact.—Irish Ironmonger.

IMPROVING SPLENDIDLY

The friends of Bob Shannon will be pleased to hear that he is progressing splendidly and expects to leave the hospital in the course of a few days. Bob is just one of those fellowcraftsmen who are an asset to the whole trade. He is a living example of what a sanitary engineer should be.

NEW APPOINTMENT

The many friends of S. W. Howard, general salesmanager and secretary of Steel and Radiation, will be interested to know that he has been awarded a very important position with Messrs. Lord & Burnham, Irvington, N.Y., and St. Catharines, Ont. This company manufactures a line of greenhouse heating specialties, boilers, radiators, etc.

It is easy enough to figure out either failure or fortune on paper, but it is a different thing when you come to making these things in real life.

Good recommendations may help a man get a job, but they are not worth much to him after he gets it, for he is then judged by what he does.

MACHINERY FOR WOMEN.

(Continued from page 13.)

is a mill run by water-power on the farm, and the mill-race is also higher than the house, so as an insurance against drought, a pipe is also run from the race to the house. The two lines of pipe connect with the cellar and it is only necessary to open or close a valve to tap either one. This is a unique case, where simple gravity raises the water to the second floor of the house, but it is not at all unique to find houses where gravity would force water from a cistern or spring or pond to the cellar, and it would cost very little money and only about ten minutes work a day to have a hand force pump in the cellar, forcing the water to a storage tank in the bathroom. Where the level of the house is above that of any available source of water supply, there is still the hydraulic ram, one of the cheapest pumping outfits manufactured.

Woman's Faith in the Little Zinc Washboard

All this deals only with the problem of running water in the house, but as a fair estimate, everything considered, a complete water system in a house reduces a woman's work by about one-fourth, besides making the farm a vastly better place to live on. The power for running machinery is another question. In districts where the "Hydro-Electric" is doing almost all the mechanical work at the barn, from sawing the wood and milking the cows to hatching the chickens, we find electric washing machines coming gradually. They would come a lot faster if women hadn't so much faith in their little zinc washboards. In fact, I'm beginning to wonder whether this proverbial faithfulness in women isn't sometimes a big mistake. It would be all right, of course, if they could believe in the right things, if they could just learn to switch their affections automatically when it has been proved that the object isn't worth them any longer, but they won't do that. Once having gone on their knees to scrub a floor, and their mothers and grandmothers having gone on their knees to scrub floors, it would be unpardonable heresy to slide back to a long-handled mop with a wringer attached to the pail.

A few farmers who have installed gasoline engines at the barn find some difficulty in persuading their wives that it would save work to have a little washhouse built beside the barn so that the engine could be used to drive the washing machine. Whether we have a power system or not a separate laundry room to take the steam and litter of washing right out of the kitchen is one of the greatest conveniences a farm house can have. An out-of-use cook-stove can generally be found to use for boiling the clothes, and the machine can be set directly over a drain to do away with the work of carrying away the water. This brings us up to one of the details that cost nothing but mean a great deal. I have never been able to understand why the man who designed washing machines put the spout in the side instead of in the bottom. It means that you generally have to tip the machine to get the last of the water out, and with a wringer attached it's pretty heavy. I have only known one person, a farmer by the way, who thought to bore a hole in the bottom of his machine and set that over a drain.

Not One Crank on the Farm

Without either electricity or gasoline, however, miracles can sometimes be accomplished through a very simple system of water-power. In Halton county a farmer had a spring on a hill one thousand feet from the house and barn, with a drop of one-hundred and fifteen feet in that distance, so he piped it down, even carrying it under a railroad track. In the back kitchen he put a little water motor, which can be belted to the washer, the churn, the meat grinder or the sewing machine. None of these machines were bought new. All that was necessary was the adjustment of a pulley to be connected by a belt with the motor. The whole outlay amounted to $200 for piping, and $85 for the motor and waterwheel, and the installation at the barn has earned enough to pay this many times over in grinding the grain and filling the silo, and turning the fanning-mill and separator and grindstone, and everything else that was formerly run by a crank.

No Ordinary Woman Would Have Tried Out the First Milking Machine

Modern methods of farming have taken the dairy industry almost entirely out of women's hands in many parts of Canada. I won't say that machinery has been responsible for this, because I like to think it's the outgrowth of chivalry or sentiment or something like that. Anyway the credit is about equally divided. There was a time when women did the milking. Then men got mowing machines and binders and they didn't have to go to the field at five o'clock in the morning, so they began to take over the milking. And as soon as men began to milk they began to see how silly it was to spend an hour or two every day at what was neither soul-inspiring nor particularly easy work, and which could be accomplished just as well in half the time, by a piece of rubber and a pump. No woman, at least no ordinary woman would have tried out the first milking-machine. She would be sure it would scare the cow or spoil her or something.

"If washing were suddenly to be put up to men, all the factories in anada couldn't supply the demand there would be for washing machines. No man would spend about one-seventh of his time scrubbing away at a washboard. He would get the best machine he could find, and then he would begin to look around for some form of power to run it. A year later he would be able to explain that it hadn't cost him a cent, because it had paid for itself. . . . In districts where the Hydro-Electric or the gasoline engine is doing all the mechanical work at the barn, from filling the silo and milking the cows and pumping the water, to hatching the chickens, we find power washing-machines coming slowly. They would come a lot faster if women hadn't so much faith in their little zinc washboards."

But a lot of women are still making butter with a tray and ladle. That means lifting from ten to sixteen pounds, about ten times in ten minutes, and tipping it to drain off the brine. It means using a short handled ladle and wrist pressure for work that would amount to almost nothing with the use of a butterworker. For a large dairy the combination churn and butterworker will be still more economical of time and labor.

The Waste of Human Force and Motion

Another piece of machinery that is only half appreciated is the vacuum cleaner, especially the sweeper. Physicians are generally agreed that sweeping is one of the hardest parts of housework,

(Continued on page 33.)

Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

"SOME QUESTIONS."

Editor Sanitary Engineer,

Kindly answer the following questions in the next issue of The Sanitary Engineer.

1. Would a flush tank; if used in a brewery.

2. Should lead joints be under police supervision.

3. Would you recommend a soil pipe for "Habitat Tabac."

Yours truly,
Should be Subscriber.

Here is a case where our "Should be subscriber" has not furnished his address and from the nature of the questions we think they require answering personally. However the questions gave us such a shock that we would like some of our readers to answer them for us. We do not profess to "know it all."—Editor.

WILL THIS LAYOUT WORK?

Editor Sanitary Engineer:

I have a customer who has added three radiators to a hot water system. The present boiler is now too small and he does not wish to tear it out and put in a larger one, but would rather have me install a small one by the side of the present one. What would you advise? If I put a small one in, would it be alright to install it as per sketch? A reply in your next issue of The Sanitary Engineer will be appreciated. The idea would be to use the small boiler in spring and fall.

Newcastle, N.B., Reader.

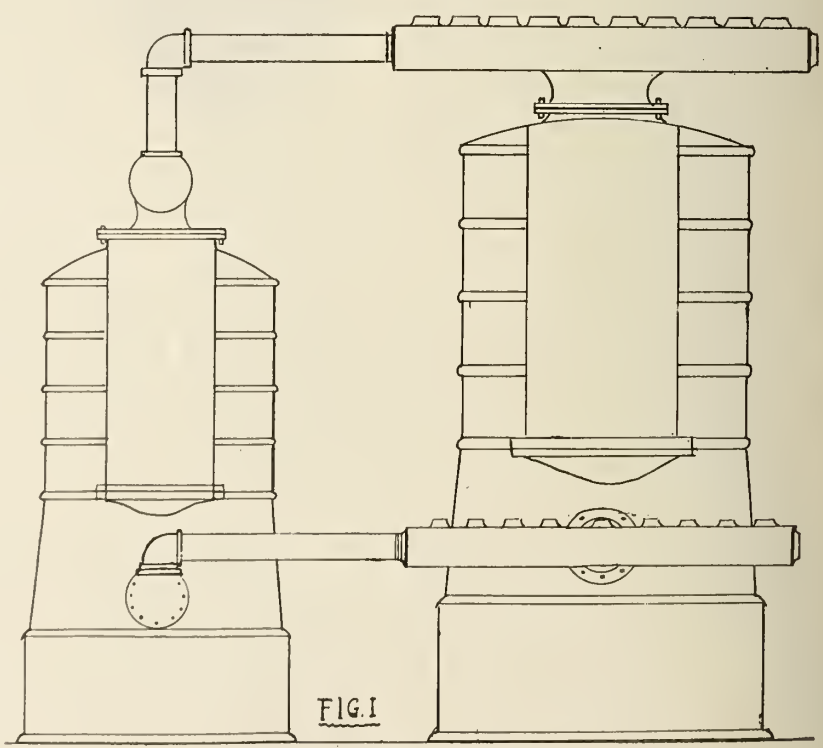
It is not very good practice to connect two boilers together in the manner shown if one boiler—the smaller, or the one added—is expected to heat the whole system during spring and fall. It would not be so bad if the additional boiler were simply expected to assist the present one, for reasons as follows:

When both boilers are being fired, all the heat is distributed through the heater which carries all the mains and returns, and they will take care of the distribution. But if the smaller boiler only is being fired, then most of the heat will be taken up by the mains nearest to the end into which the small boiler is connected. The heat would follow the line of least resistance every time.

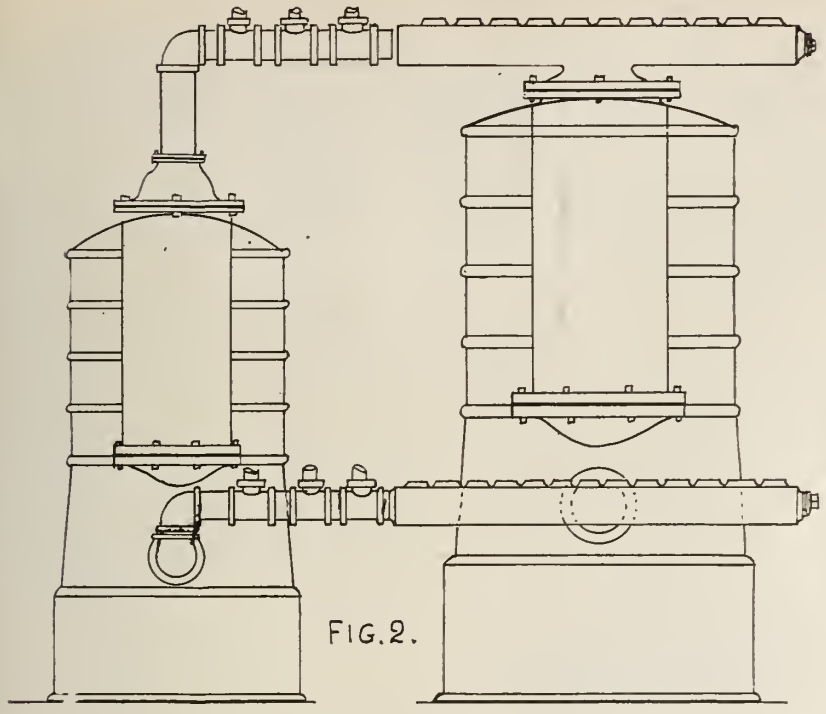
There are two ways by which this matter could be handled, both of which would work satisfactorily.

First, would be to build up or buy a header and place the mains and returns which are required for the additional radiation along with about one-third of the present mains into it, thus equalizing the means of distribution. Second would be to order a twin header for feed and return, to fit the two boilers.

The latter method would be the best, though it may be a little more costly. The fact of the matter is, unless the job is done right, it will be a continual source of grievance, and in the end will be a more expensive proposition than doing the work right at the start. Without doubt, the plan shown in Fig. 1 would not give satisfaction. It may work if the fire in the small boiler is forced very hard, but the extra forcing of the fire would mean the burning of more coal than if the two boilers were



Sketch submitted by enquirer.



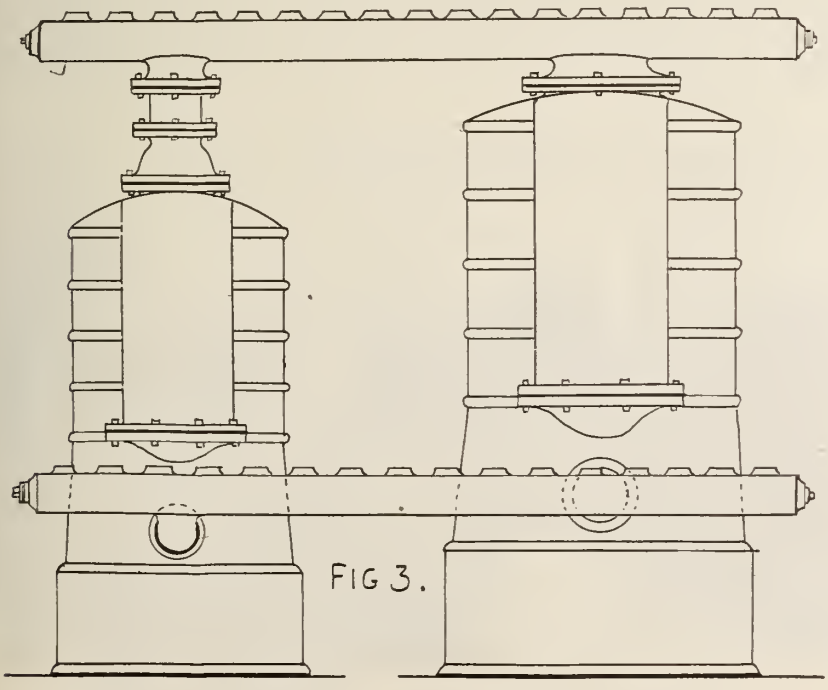
Suggestion which would overcome the trouble.

being run at one time. If our reader will furnish us with the make of boilers, and the size of the present boiler as well as the one he proposes to install, we can then give him full particulars how to go about the work. Figs. 2 and 3 show the two methods suggested by us.—Editor.

MACHINERY FOR WOMEN.

(Continued from page 31.)

on account of the twisting motion that goes with it. Even the vacuum cleaner run by hand does away with all this, and can be had for from eight to ten dollars. We read a lot about harnessing force and motion, but until we learn something about the human force and motion that this might substitute, we will never realize the need of mechanical force. If we could estimate the energy spent in doing the weekly ironing with an electric iron, where the worker just stands and pushes the iron, always at a uniform temperature, and compare the output of energy with what is used in the old method, the trips to and from the stove, the rekindling of fires, the inconvenience of the iron cooling—if we could realize the difference, an electric iron would be among the first appliances installed when electricity comes to a farm. If we would stop to think of the inconvenience of some of our houses, or that every time a person takes a step up in climbing a stair, it is necessary to lift the weight of the body, we would have our houses furnished with dumb-waiters, just as our barns are fitted with feed chutes and litter carriers.



Small and large boilers fitted with twin header.

The Logic of It

We might talk about a lot of other things like bread-mixers and dish-washers and dinner-wagons, and dustless mops and long-handled scrubbers, but already the list seems rather long for a year when thousands of people are suffering for the very necessaries of life. Keeping this fact right in the foreground, we can begin to see why the women on farms, now, more than ever before, need the labor-savers in the house, that will give them more time for other things. During the next few years they will feel a new responsibility in really productive work. It may be dairying or poultry or gardening or canning, but someway they will want to make money, and to help to feed people. From our centres of population very soon will be heard the bitter, wondering cry of hundreds of homeless children. They are the city's children, of course, but what can the city do with them? It can put them in an institution, but a child doesn't thrive in an institution. The same thing will happen that has happened always before. The arms of the women in the country will reach out for them, and for the little while that they are children the warmth of these mother-hearts, and the shelter of their homes, and the freedom and purity of the fields, will make them forget, and possibly take out of life completely, the curses of its sad beginning.

Then our own children, they need more of their parent's time not for care but for comradeship. Also the majority of farm homes have just a one-woman staff, and occasionally the woman wears out and the farm has to be abandoned—a real calamity just now. At the same time farms are standing vacant. It is not at all unusual to hear a man say, "I would go on a farm, but my wife couldn't stand farm work." This is not imagination. No doubt she couldn't, as farm work for women was twenty-five years ago. As it can be made now, it is no harder than housework in the city.

Of course there is the question of expense, but the outlay for the entire equipment mentioned here would not amount to more than the cost of an ordinarily-priced automobile and an automobile is becoming pretty common on a farm.

—PURO—

SANITARY

Drinking Fountains

WILL PROVE A PROFITABLE LINE TO HANDLE

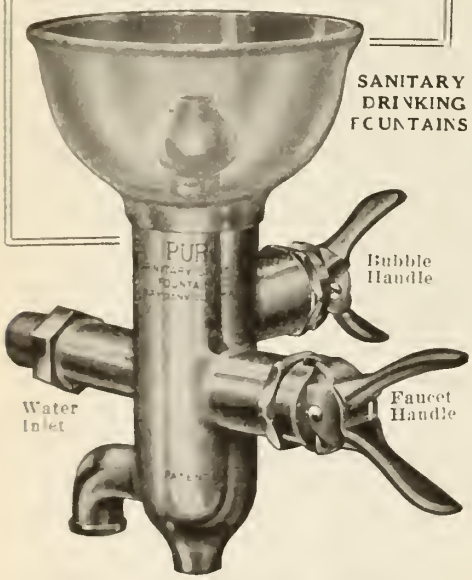
BECAUSE

The "Safety First" movement, which is becoming more popular every day, is particularly feasible where the conservation of the Public Health through pure drinking water is concerned. The old-fashioned, disease-laden public drinking cup will soon be but a memory in thousands of plants, offices, shops, public parks, schools etc.

Herein lies the opportunity of the live Sanitary Engineer to materially add to his business by getting after those institutions and supplying them with the "Puro," the most economical and sanitary drinking fountain on the market.

The Puro Sanitary Drinking Fountain will recommend itself because of its simplicity of attachment and its automatic control.

Write to-day and let us show you how to make a handsome profit, not only on the sale, but also on the installation of the "Puro."



Puro Sanitary Drinking Fountain Company

147 University Ave., Toronto, Canada

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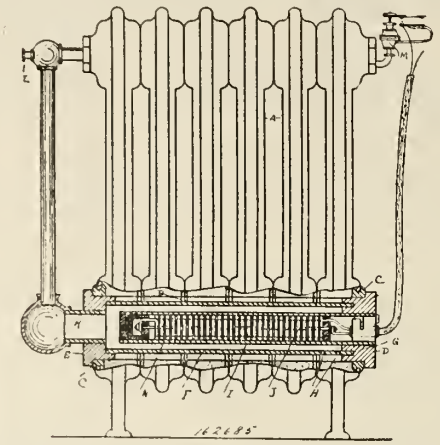
NEW CANADIAN PATENTS

No. 162,685. Electric Radiator.

The Electric Steam Radiator Company, assignee of Clinton D. Swett and John D. Ross, all of Portland, Maine, U. S. A., 25th May, 1915; 6 years. Filed 3rd October, 1914. Receipt No. 243,690.

Claim.—1. An electric radiator comprising a series of radiator sections with aligned communicating openings in the bottom thereof, two concentric tubes in



said aligned openings, the outer tube being provided with an intake at one end, and at the other end with a circulation pipe leading to the top of the radiator, and the inner tube provided with an electric heater.

2. An electric radiator comprising a series of radiator sections having aligned connecting openings in the bottom thereof, threaded nuts adapted to close said openings at the ends of the radiator, concentric tubes in said aligned openings supported by said nuts, the outer tube being provided with an intake near the end and with a circulation pipe leading from the other end to the top of the radiator and the inner tube being provided with an electric heater.

3. In an electric heater, a liquid container, two concentric tubes located therein, the outside tube being provided with ports leading to the container and the inner tube closed to the container and provided with an electric heater.

THE CANADIAN NATIONAL EXHIBITION

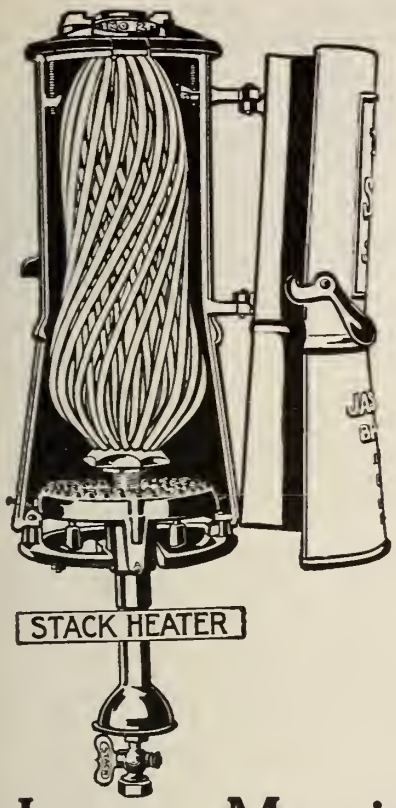
(Continued from page 18.)

elled bath cost $25. The same bath can be bought to-day for about $18. Nickel-plated traps, etc., are better made to-day and are not less than 20 per cent. cheaper in price, and then the plumber is looked upon as one who charges exhorbitant prices.

The trouble is we have not blown our own horn sufficiently, but we are beginning to do so at last, proof of which was clearly shown by the splendid variety and number of exhibitors. Not one single line was left out. Cast iron enamelware, brass goods, lead pipes, manufacturing W. C. tanks, steel boilers, steel pressed radiators, cast iron boilers and radiators, pneumatic water supply systems, all manner of gas heating appliances, heat regulators, water heating, and all kinds of steam specialties. The smokeless boiler was very much in evidence, which should be a source of pride when we remember that the honor of getting out such a long-felt commodity fell to the lot of the heating engineer.

These and all other improvements certainly reflect great credit on our calling, which without doubt many engaged in it dearly love. A great deal of this is due to the untiring efforts of our manufacturers, who are ever ready to carry out the wishes of the trade in bringing out any and every practical article which will eventually become of use to the sanitary and heating engineer in keeping ahead of the times.

View in grounds of Canadian National Exhibition.



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The STACK proved the best in every test.
The STACK heated the water quickest.
The STACK heated the water hottest.
The STACK heated the most water.
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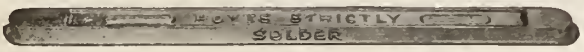

We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

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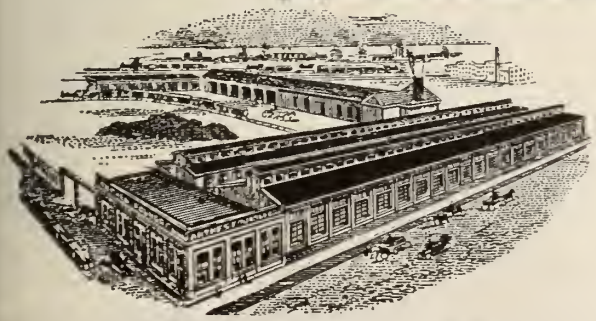

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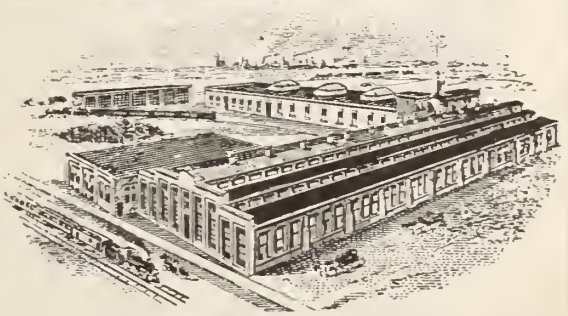

ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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Air Moistener Co., The 36
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Anthes Foundry Co. 35
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Warden King, Ltd. 3
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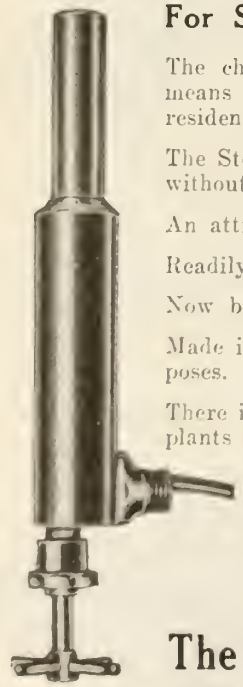

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The Steamo discharges vapor absolutely without noise or dripping of water.

An attractive nickel-plated device.

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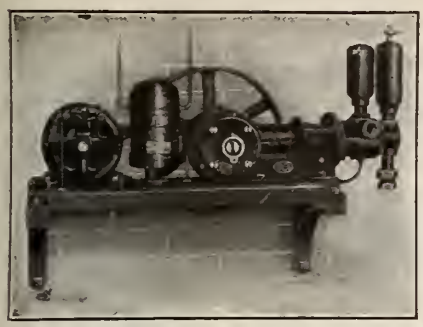

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BOX 95. SANITARY ENGINEER TORONTO

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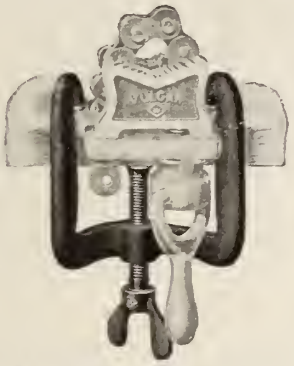

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And a Light Mount for Field Work

Firm and portable, and furnished with or without the "Legs" of Standard Pipe Sizes, simple and convenient, that fills a long-felt need.

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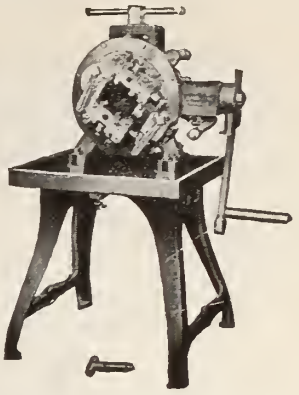

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This machine cuts off and threads pipe from 1 in. to 4 in., right or left.

Threads Rods from ½ in. to 2 in., right or left.

American or Whitworth Threads.

Using the genuine Armstrong Dies.

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A time and labor saving machine.

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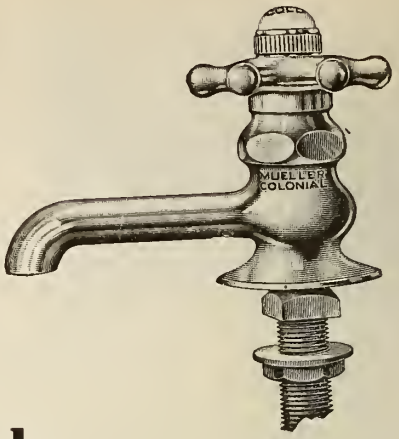
is put there for the same reason you put your name to a check—which is to show that it is worth one hundred cents on the dollar.



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Do what other plumbers are doing—use it—and have satisfied customers.

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H. Mueller Mfg. Co. Ltd.
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Send me literature and quote me prices on Self-Closing Work.

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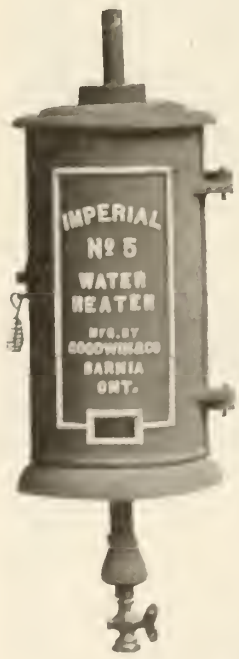
The New "Imperial" Gas Water Heater
HOT WATER IN A "JIFFY"



The coils are arranged so that the water has complete circulation. No dead heads to lime up and the water must pass through each and every section, thus ensuring scalding water in a few seconds.

The new "Imperial" is a sure friend-maker and business-getter everywhere, and it gives a good profit.

Take a few minutes now and write for full particulars.

Goodwin & Company, Sarnia, Canada

Classified Buyers' Guide

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Acetylene Gas Generators.
P. Campbell & Co., St. John, N.B.

Air Line Systems.
C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
C. A. Dunham Co., Ltd., Toronto.
Gurney Foundry Co., Ltd., Toronto.
Honeywell Heating Specialty Co., Montreal.
Jenkins Bros., Ltd., Montreal.
Kerr Engine Co., Ltd., Walkerville.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Aquarias.
A. F. Small, Toronto.

Asbestos Goods.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Boilers, Steam or Hot Water.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Boiler Feed Regulators.
C. A. Dunham Co., Ltd., Toronto.
Standard Sanitary Mfg. Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.

Brass Goods, Valves, etc.
Canadian Wolverine Co., Ltd., Chatham.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
C. A. Dunham Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Jenkins Bros., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.

Brass Pipe and Tube.
Canadian Wolverine Co., Ltd., Chatham.
Empire Brass Mfg. Co., London.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Cellar Drainers.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Penberthy Injector Co., Ltd., Windsor, Ont.

Closets.
Amherst Foundry Co., Amherst, N.S.
B. O. T. Manufacturing Co., Toronto.
Cluff Mfg. Co., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Sanitary Mfg. Co., Toronto.

Consulting Engineers.
H. L. Seymonr.

Correspondence Schools.
Anglo-American Sanitary School.

Country Residence Equipments.
Empire Brass Mfg. Co., London.
General Machinery Co., Ltd., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Limited, Toronto.
Jno. Stevens & Co., Ltd., Winnipeg.

Damper Regulators.
C. A. Dunham Co., Ltd., Toronto.

Drainage Fittings.
Empire Brass Mfg. Co., London.
Fittings, Limited, Osbawa.
International Malleable Iron Co., Ltd., Guelpb, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Ejectors, Steam.
James Morrison Brass Mfg. Co., Toronto.
Kerr Engine Co., Walkerville.
Penberthy Injector Co., Ltd., Windsor, Ont.

Ejectors for Sewage.
National Equipment Co., Ltd., Toronto.

Enamelware.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

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Ashdown Hardware Co., Ltd., Winnipeg.
Empire Brass Mfg. Co., London.
General Machinery Co., Ltd., Toronto.
National Equipment Co., Ltd., Toronto.
Jno. Stevens & Co., Ltd., Winnipeg.

Fittings.
Empire Brass Mfg. Co., London.
International Malleable Iron Co., Guelph.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Flushometers.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
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Galt Brass Co., Ltd., Galt.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
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Gurney Foundry Co., Ltd., Toronto.
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James Morrison Brass Mfg. Co., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

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Gurney Foundry Co., Ltd., Toronto.

Gasoline Engines.
National Equipment Co., Ltd., Toronto.

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Gurney Foundry Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Gas Generators.
P. Campbell & Co., St. John, N.B.

Generators.
Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Gurney Foundry Co., Ltd., Toronto.
Harris Construction Co., Ltd., Montreal.
E. S. Manny Co., Montreal.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
Empire Brass Mfg. Co., London.
Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Lighting Plants.
P. Campbell & Co., St. John, N.B.

Mixing Valves.
Geo. Carpenter, Montreal.
Standard Sanitary Mfg. Co., Toronto.

Nipples.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
C. M. Kemp Mfg. Co., Baltimore.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
Warden King, Ltd., Montreal.

Oil Storage Systems.
General Machinery Co., Toronto.
National Equipment Co., Ltd., Toronto.

Packing.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

Pipe Joint Compounds.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

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Can. H. W. Johns-Manville Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Warden King, Ltd., Montreal.

Pipe Threading Tools and Machinery.
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John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn., U.S.A.

Porcelain Ware.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Cluff Bros., Church St., Toronto.
C. A. Dunham Co., Ltd., Toronto.
General Machinery Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
John Stevens & Co., Ltd., Winnipeg.

Radiators.
Gurney Foundry Co., Ltd., Toronto.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Radiator Foot Rests.
Beaton & Cadwell Mfg. Co., Ltd., New Britain Conn.

Radiator Traps (Steam.)
C. A. Dunham Co., Ltd., Toronto.

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C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

Septic Tank Valves.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.

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Hoyt Metal Co., Toronto.

Steam Specialties.
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C. A. Dunham Co., Ltd., Toronto.
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Honeywell Heating Specialty Co., Montreal.
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Kerr Engine Co., Walkerville, Ont.
The E. S. Manny Co., Montreal.
Penberthy Injector Co., Ltd., Windsor, Ont.

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Canadian Morehead Co., Ltd., Woodstock.
C. A. Dunham Co., Ltd., Toronto
Harris Construction Co., Ltd., Montreal.
E. S. Manny Co., Montreal.

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James Morrison Brass Mfg. Co., Toronto.

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Canadian Tap & Die Co., Ltd.
Hall & Sons, Ltd., Brantford.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Nicholson File Co., Port Hope, Ont.
Williams, J. H., & Co., Brooklyn, N.Y.

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C. A. Dunham Co., Ltd., Toronto.

Vitro Tanks.
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Water Supply Systems.
Ashdown Hardware Co., Ltd., Winnipeg.
Empire Brass Mfg. Co., London.
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H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
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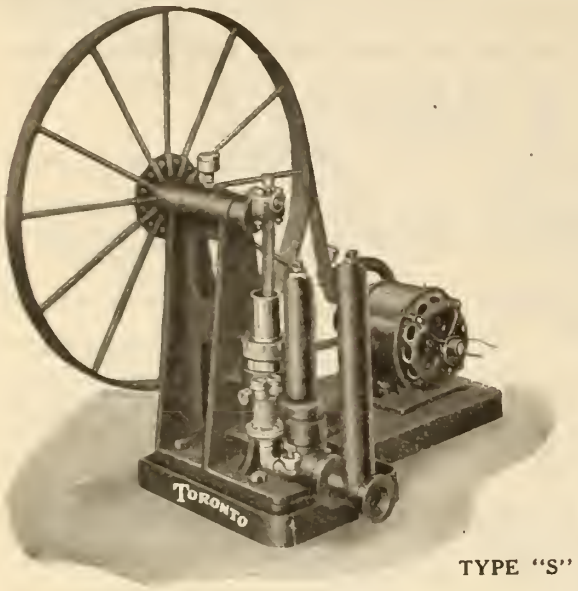
TORONTO

DOMESTIC

Water Service Systems



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TORONTO SILENT ELECTRIC HOUSE PUMP

Pronounced by Experts to be Absolutely Without an Equal

Noiseless, economical and singularly efficient in operation, this pump sells itself, as it is so obviously above competition.

SEND FOR ILLUSTRATED FOLDER "S."

Our engineering department is at your service. Consult us about your water service problems.

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Every Sanitary and Heating Engineer in Canada should know a little of the laws in force in his province.

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Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED

Montreal Works: Lachine Canal

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Dart Unions

EASILY CONNECTED—
A ball-shaped joint that makes the connection so long as the nut can be started on its thread.

PERMANENTLY TIGHT JOINTS—
No deterioration of any kind at the joint, nor is the joint affected by expansion, contraction or vibration.

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The bronze to bronze non-corrosive joint and solid parts eliminate replacement. The union may be connected time after time without expense or bother.

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No up-keep cost, no replacement cost and no loss from leaks.

GUARANTEE—
We will replace 2 for 1 any union bearing our Trade-Mark, that does not give absolute satisfaction and fulfill our claim.

CUSTOMERS—
Are given a satisfaction that ensures you their future business.

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Manufactured by Dart Union Co., Limited, Toronto, Canada

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NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

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Help us keep it busy.

REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials, and increased employment of Canadian labor.

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Consistent Prices.

Best quality of goods.
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Valves and Hydrants Exclusively

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"PERFECTO"
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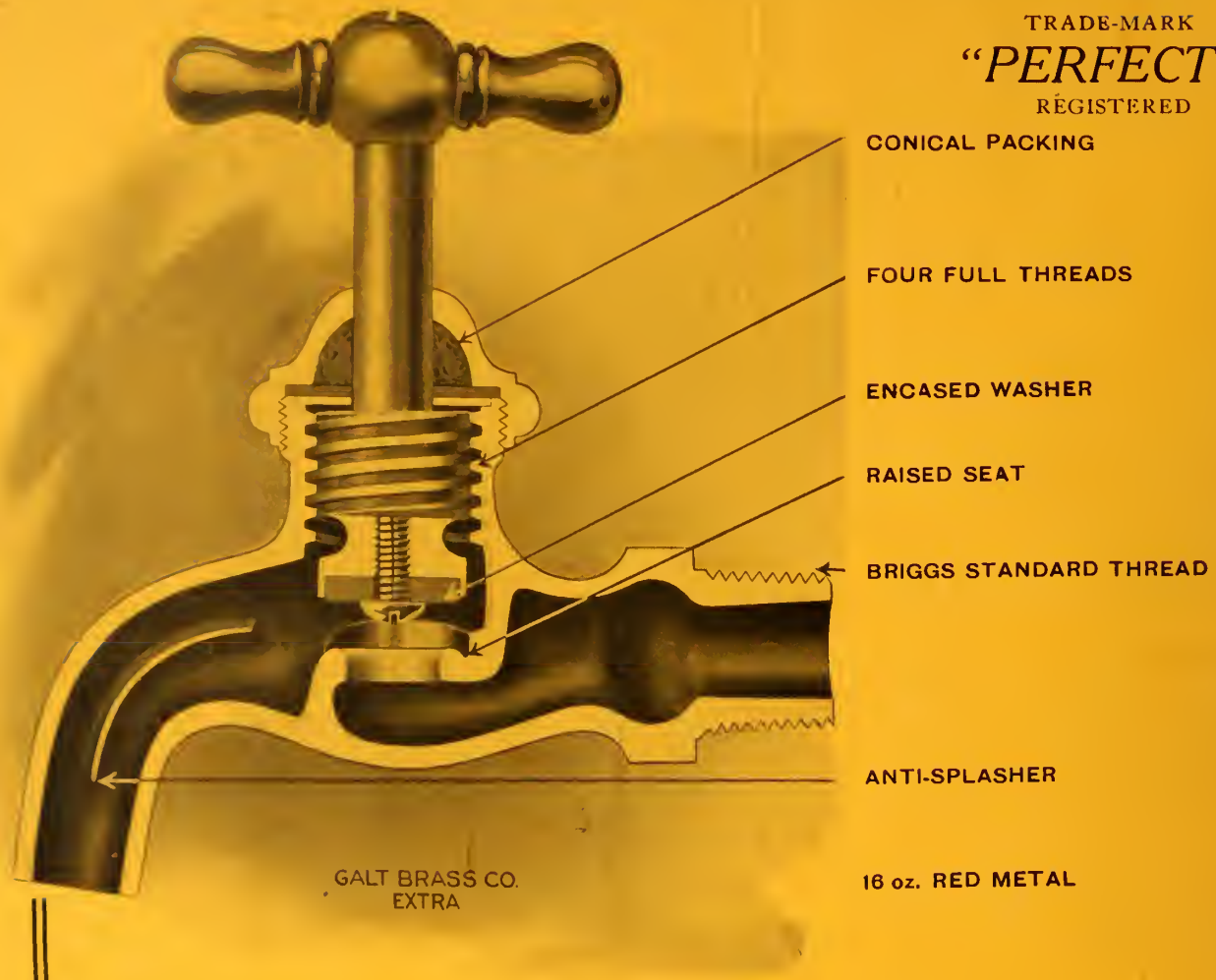

The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all **Quickopening**, having **Double Thread** on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada

THE SANITARY ENGINEER
PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol. IX | Publication Office: TORONTO, OCTOBER 1, 1915 | No. 19

"LEIGHTON" AND "LEICESTER" LAVATORIES

The slab is a plain oval design, without any ornamentation. Supported either on Enameled Pedestal, Enameled Pedestal Leg or Enameled Bracket, it retains the simple gracefulness of outline and proportion which has been the predominating influence in its selection for so many of Canada's highest class Homes.

TWO SIZES—19 x 27 in. and 22 x 33 in.

F110 and F110½ "LEIGHTON" on Enameled Pedestal.
F111¾ "LEICESTER" on Enameled Pedestal Leg.
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General Offices and Factories: Port Hope, Canada

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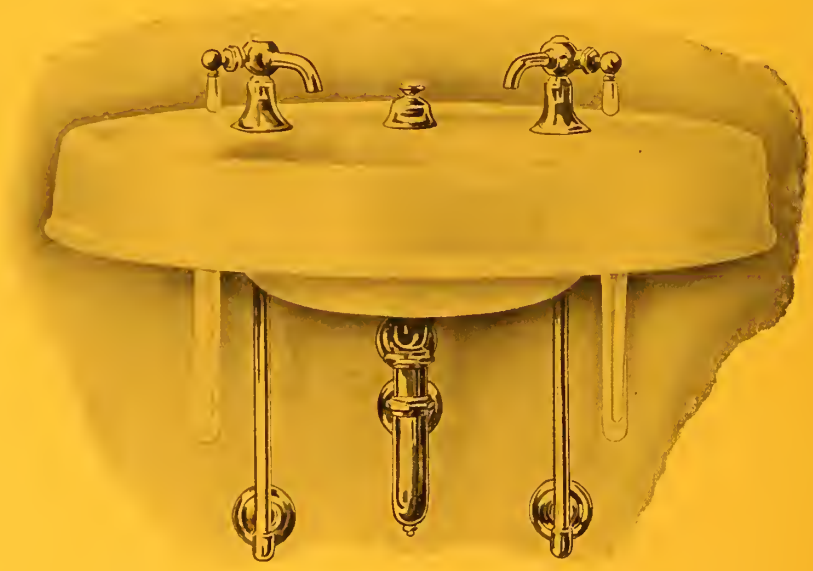
Beaver Brand
Cast Iron Enameled Ware

Unsurpassed for Pure Whiteness of Color, Attractiveness of Design, Finish and Durability.



The above cut shows one of our many styles of lavatories.

These goods are very much appreciated by the trade.

Buyers who want the best, insist on **Beaver Brand Goods.**

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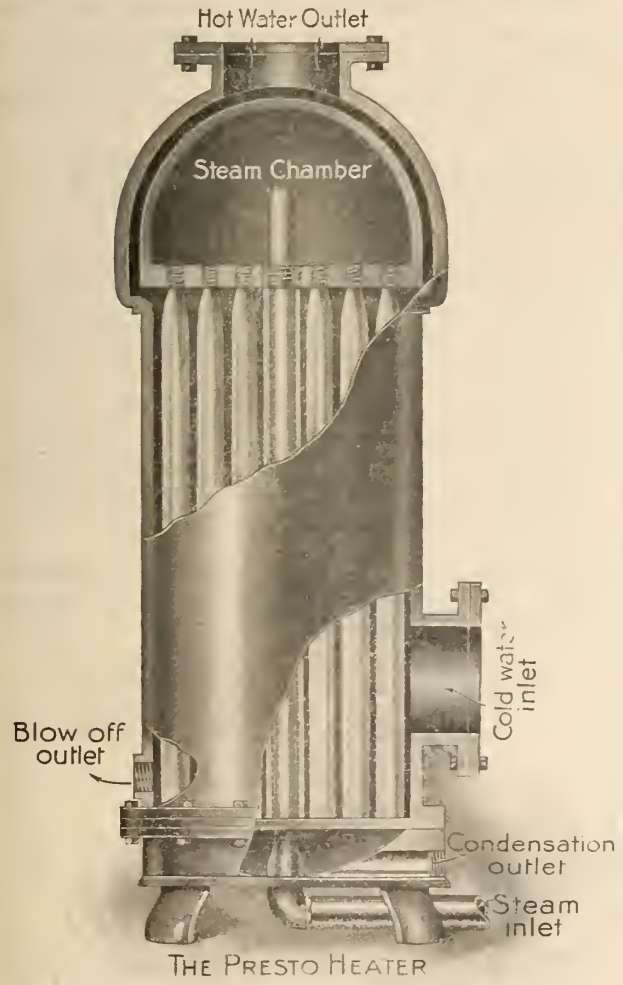
is the outstanding feature of the Presto Heater

A maximum of heat with a minimum of fuel is the result shown with every installation.

This is an actual statement of fact and investigation will prove that every Presto Heater in operation is giving complete satisfaction.

It is also a fact that we have never had a single complaint. The Presto Heater is built to give satisfaction and is built to last. The Presto is the first choice of those who know.



THE PRESTO HEATER

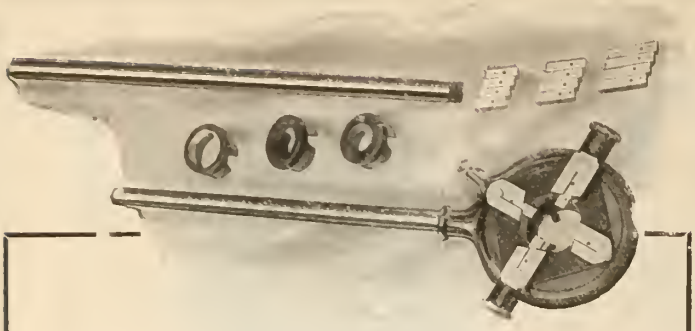
Keep a close watch for buildings requiring a boiler of this type. We will assist you to land the order.

In the meantime write us for full particulars regarding the Presto. Acquaint yourself with its many good points so that you will be in a position to give full particulars when necessary.

Drop us a line to-day
You may need the information to-morrow.

Harris Construction Co.
LIMITED

120 Sanguinet Street, MONTREAL



"Toledo" Adjustable Ratchet Threading Tool No. 1-A.

TRADE MARK J REGISTERED

Ratchet allows threading to be easily done in ditches or positions close to walls or ceilings. Will thread a very short piece of pipe.

One man ean easily thread a Two-Pipe with this tool.

JARDINE & TOLEDO Pipe-Threading Tools

HAVE CUTTERS WITH THE CORRECT CUTTING PRINCIPLE, VIZ:

As the tool advances on the pipe the cutters open out so as to make a proper taper on the thread. The cutting is all done by the mouth of the cutter—the back threads don't cut, they don't rub on the thread, they merely steady the tool.

THE THREADS ARE AS CLEAN AND PERFECT AS IF CUT IN A LATHE.

One man can thread 2" pipe in 1 minute.
One man can thread 4" pipe in 8 minutes.
One man can thread 6" pipe in 16 minutes.
One man can thread 8" pipe in 30 minutes.

OTHER SUPERIOR FEATURES ARE, viz:

Lead screw that ensures perfect pitch and form of thread.
Lightness and compactness of stock.
A set of cutters for each size of pipe.

All Threads finished at one cut

Adjustable to all variations of fittings.
No cams or jimeracks to wear and get out of order.
Long life of cutters, low maintenance cost.
Drop a line for our pipe die catalog to-day.

MADE IN CANADA

One Man does the work of two

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HESPELER, ONT.

Sole makers of "Jardine" Pipe-Threading Tools.
Sole licensees to manufacture and sell Toledo Pipe-Threading Tools in Canada.

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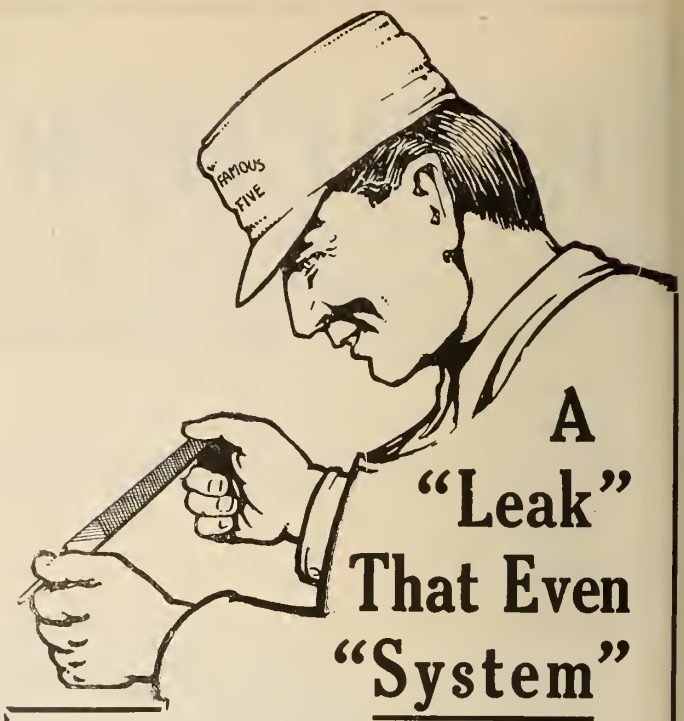

A "Leak" That Even "System" Couldn't Catch

A MANUFACTURER was boasting that his shops were so systematized, that no "leak" nor waste could possibly occur.

We knew something of his product—equipment—methods—and output. So we asked how many files he used each year.

When he mentioned the figure, we said we could show him a "leak" that would astonish him.

"Do it," he said.

And we did!

Showed him how his workmen were using their files too long. Were wasting time getting the last bit of wear from each file—instead of discarding them when their BEST efficiency was gone. Were saving "pennies" in file-cost—and throwing away "dollars" in filing-time.

We proved to him—by personal experience in his own shops—on his own work—that the more files he used the more money he SAVED. That the time saved and the extra work produced by using only EFFICIENT files, more than paid for the slight extra cost of additional files. While his old way of **wearing-out** files costs many times its price in wasted labor.

He "saw the light." To-day, his workmen use only EFFICIENT files. And of course they're the "Famous Five":

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AMERICAN
ARCADE
GLOBE

(Made in Canada)

Nicholson File Company

Port Hope — Dealers Everywhere — Ontario

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We manufacture and carry in stock a complete line of flanged fittings, both standard and extra heavy.

Also screwed steam fittings.

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What does it mean to you? This is your guarantee of perfect pumps.

Our pumps are not an experiment because **we have the know how** which produces satisfactory pumps.

THE AYLMER silent, automatic, electric pressure system pumps are originally introduced to the trade in Canada by men of our organization. They are the pumps which are absolutely silent in operation, and designed to pump the water without unnecessary strain, because the water is kept in motion all the time.

There is nothing just as good as the Aylmer. Be sure to get the original (Aylmer) and insure satisfactory results.

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YOU OUGHT TO HAVE THIS ON FILE. DO IT NOW.

AYLMER PUMP & SCALE CO., Limited

Aylmer, Ont.

The Home of What Is Best in Water System Outfits.

NOW

is the time to equip Homes with the TUEC Stationary Cleaner so that they can be kept sanitary, clean and ventilated throughout the Winter.

For particulars as to an agency write to:

THE UNITED ELECTRIC COMPANY

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TUEC received GRAND PRIZE at Panama-Pacific Exposition.

Stevens' Water Supply Systems

FOR

Town and Country Homes

NONE BETTER

Write for Catalogue illustrating our Hand Pump Outfit —Power Pump Outfits—Plumbing Fixtures and Fittings generally used for plumbing the average house, also for blueprint of septic tank.

We Make Prompt Shipments

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Limited

DEALERS IN

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Pneumatic Pressure Systems

661 Henry Ave. - WINNIPEG

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FORMER RESIDENCE OF THE LATE QUEEN VICTORIA OF ENGLAND

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SUMMER RESIDENCE OF THE KING AND QUEEN OF SPAIN

SANDRINGHAM HOUSE
COUNTRY RESIDENCE OF THE KING AND QUEEN OF ENGLAND

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"Standard Sanitary" Plumbing Fixtures can be obtained anywhere in the Dominion. They are handled by leading Plumbers throughout the provinces and are carried in stock by Jobbers and Sales Agents throughout the Dominion of Canada, thus facilitating prompt deliveries.

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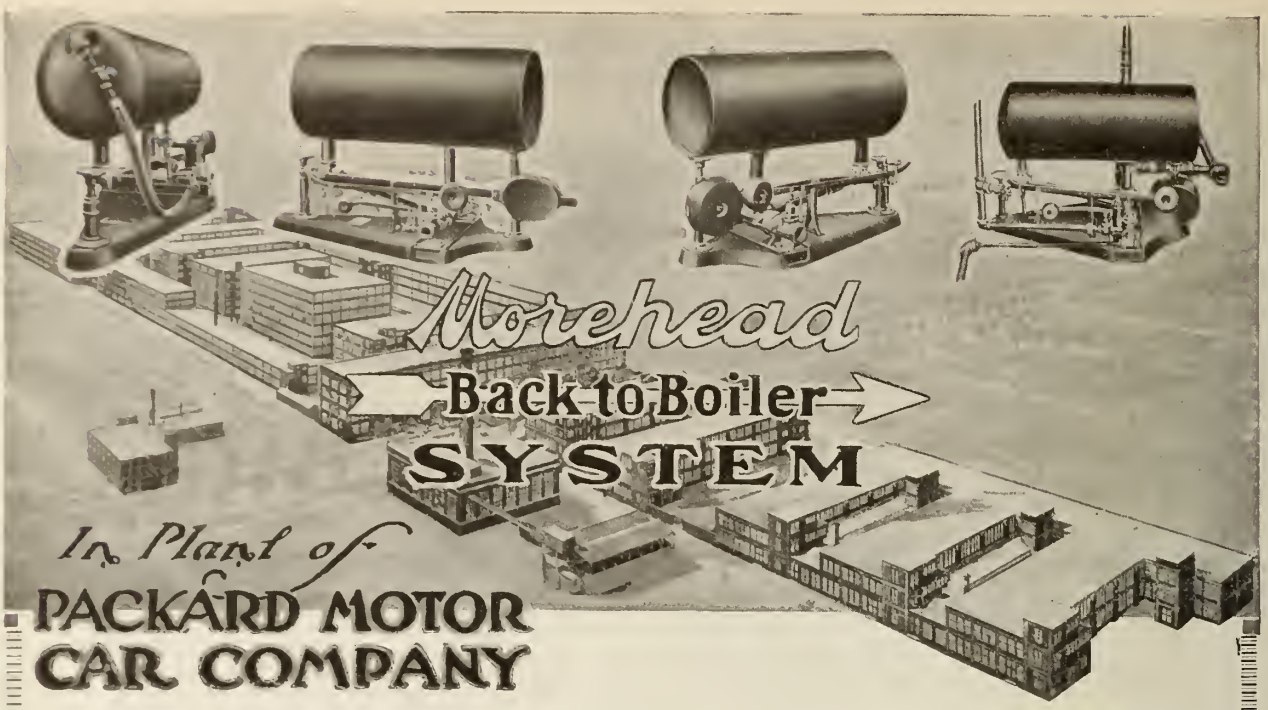
BUCKINGHAM PALACE
OFFICIAL RESIDENCE OF THE KING AND QUEEN OF ENGLAND, LONDON

PALACE OF THE KING OF THE BELGIANS
BRUSSELS



Morehead
Back to Boiler
SYSTEM
In Plant of
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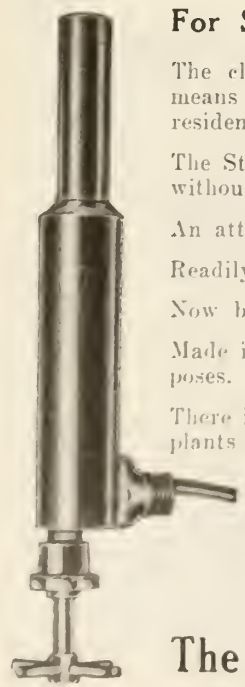
the "Morehead" System is draining 35,000 feet of 1-inch coil pipe in fan stacks of the Sturtevant System, pulling condensation out of the high pressure (225) coils of the enameling ovens and draining separators, vacuum lines and steam-heated machinery of every description.

This installation—which includes units of all four types—is typical of the wide application the "Morehead" System is enjoying in industrial plants, office buildings, etc., etc., everywhere.

No matter how large or small your job may be—if it involves the use of steam—the "Morehead" System will save money for your clients—and build good-will for YOU.

Address Dept. "C" **Canadian Morehead Mfg. Co.,** Woodstock, Ontario

THE
Steamo Air Moistener



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For Steam Heating Systems

The cheapest, best and most practical means for humidifying apartments, residences, schools, offices, factories, etc.

The Steamo discharges vapor absolutely without noise or dripping of water.

An attractive nickel-plated device.

Readily attached. Easily regulated.

Now being specified in the best work.

Made in a variety of sizes for all purposes.

There is now no reason why all heating plants should not be designed to embrace the great advantage of humidity, or existing steam plants amplified.

Descriptive matter and prices on request.

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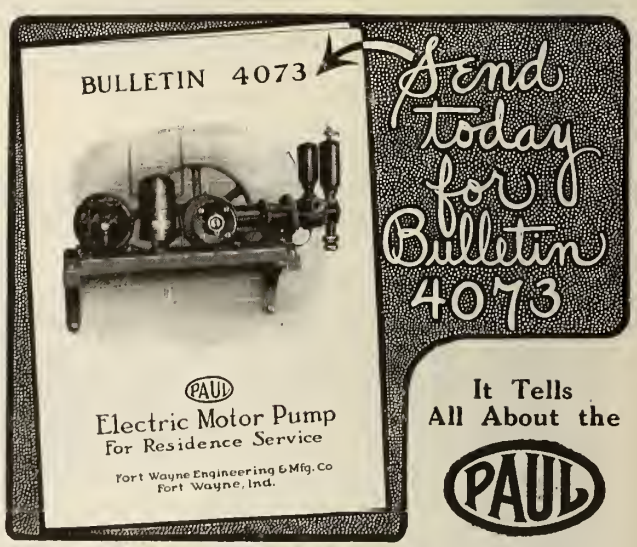

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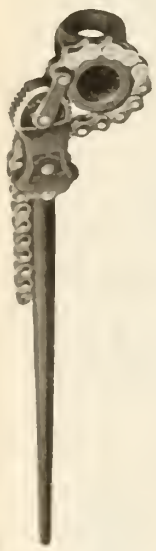

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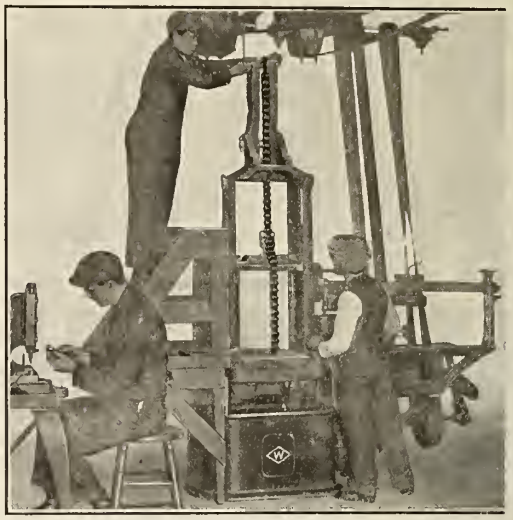

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SANITARY ENGINEER

PLUMBER and STEAMFITTER of CANADA

Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, OCTOBER 1, 1915 No. 19

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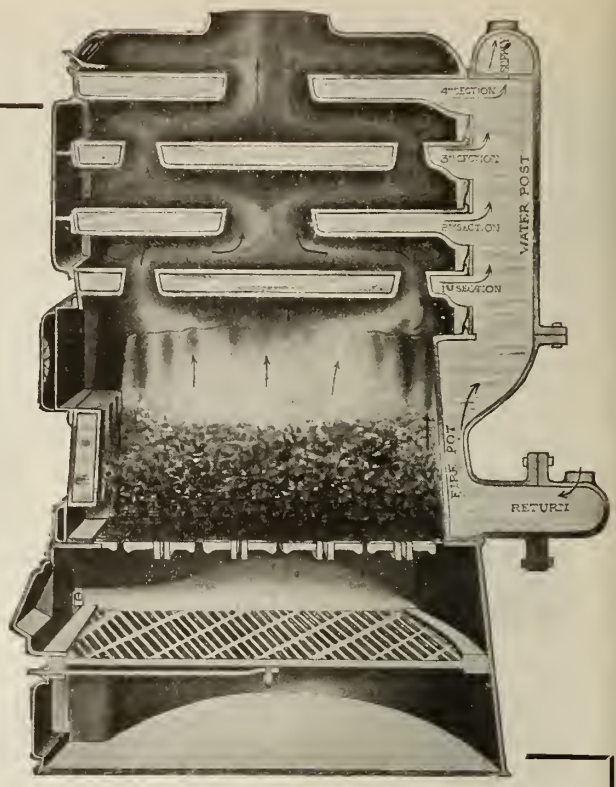

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THE SANITARY ENGINEER

VOL. IX. OCTOBER 1, 1915 No. 17

What Modern Sanitation Has Done

No Great Undertaking is Possible To-day Unless Sanitation and Sanitary Measures Are Given Every Attention. Sanitation is of World-Wide Importance. It Renders Possible Long Journeys on Railways and Steamboats. The Present War Could Not be Carried on Unless Modern Sanitary Science Were Playing its Part.

THE importance of modern sanitation cannot at this day be overestimated. It is an indispensable concomitant of every big undertaking. Our railways could not have been built under the healthful conditions that have everywhere obtained had not every known sanitary measure been adopted in the construction camps. Great concentration camps for our army could not exist were not every known sanitary measure given an important part to play.

Modern sanitation is the forerunner of good health in all walks of life, whether it be in town, city or country; whether it be in peace or war. Yea, whatever the undertaking sanitation must be given its duty to perform.

Think of the value of sanitation in the conservation of life on the battlefield of the present day. Some of the best and highest military authorities of the day admit that the greatest loss of life in previous wars was not due to the numbers killed on the firing line, but rather to the congestion in camps, poor water supplies, and other insanitary conditions which could not be coped with in those days.

Just imagine what would happen today were such conditions to prevail as were common even so recently as in the South African War.

The first man to prove what could be done in the matter of sanitation was General Gorgas, when he cleaned up the Panama region and made possible the completion of that modern world wonder.

During recent years great strides towards a perfect system of hygiene for the public have been made, but there is still a great deal more to be done. The dirty common drinking cup formerly used at the fountains in public squares has now in many progressive cities, been replaced by the bubbling fountain, which provides the men in the street with a sanitary drink of water. This system has only been recently adopted for the Eastern cities, but in the West it has been in vogue for some time. When the lips touch the rim of a drinking cup a little saliva is invariably left there, which may contain disease germs. These will adhere to the lips of the next user of the cup. To obviate this the railways of the country and other institutions have adopted the system of individual paper cups, which immediately after use are destroyed. Another step towards cleanliness. Then the disappearance of the common roller towel in most places has been replaced by the individual towel. Soap is another known germ carrier, and many hotels and railway companies, to say nothing of smaller concerns have discarded the use of common soap on this account, and the individual bar of soap has been instituted, while in other places the liquid soap has been experimented with. It has been proved that the latter is not susceptible as a germ-carrier and from a sanitary point of view is the best for use in the public toilet room. It is a question which has come under the severe fire of many critics but, the time is fast approaching when the problem will be satisfactorily solved.

Railway companies have played a very important part in promoting progress in sanitation by adopting almost every known sanitary measure in order to make their cars and coaches as healthful as possible. They have almost universally discarded the roller towel, they have spent thousands of dollars on lavatories. The writer recently made a journey of several thousand miles and was almost amazed to note the beautiful and efficient accommodation provided, not only in cars making long trips, but also in those used for shorter journeys, proving that railway companies are not only interested in the successful transportation of their patrons from place to place, but also in their health and comfort. Today any person can travel from the Atlantic to the Pacific, and feel none the worse for the journey. Only a few years ago such a journey was looked upon as a painful long-drawn-out ordeal. In fact, taking it all in all, there is far more consideration given to the travelling public on our Canadian railways than is given to the citizens by our municipalities. There are, however, two things which should be abolished, not only on railways, but in all public or semi-public lavatories, and that is the comb and brush. No doubt these will receive some attention at an early date.

There are so many diseases which have to be guarded against where people congregate together, and the most communicable diseases are caused by minute living plants, called bacteria. They grow in a person's mouth, nose, throat, lungs, hair, and other parts of the body and cause sickness which varies in its nature according to the kind of bacteria present. These little organisms are thrown off from the body of diseased persons in various ways, and the introduction of perfect sanitation is the only means to prevent the spread of these germs which cause human disease. With this end in view railway companies insist on the observance of certain regulations governing cleanliness. All cars, whether sleepers diners, first or second class, or immigration cars, are thoroughly overhauled after a journey by a great army of cleaners: sweeping, mopping, dusting, brushing and fumigating being systematically carried out. Even the ice used for the drinking water is handled with tongs, and the ice carried for the purpose in a special bucket. But while all these rules and regulations governing a better stan-

dard of hygiene are being enforced, the common hair-brush and comb still hold sway in high-class hotels and on the railways. This is very remarkable, especially in view of its germ carrying proclivities. No matter how frequently the brush and comb may be washed and disinfected, it is an utter impossibility to keep them free from carrying germs. Under these circumstances it is rather remarkable that the railway companies, who are usually to the forefront in matters of this character, have not discontinued the use of the common hair-brush and comb from the hotels and sleeping cars. Furthermore, every day the regular traveller is becoming more and more educated to the principles of hygiene and he is nowadays beginning to realize that it is safer to carry one's own necessaries, especially those of this nature, so that the abandonment of the brush and comb would not be very much missed.

Credit is undoubtedly due to our Canadian railway officials for their adoption of sanitary measures, not only for the benefit of the travelling public, but also of the citizens in general, in that at almost every station lavatories have been provided. Were it not for these conveniences at the stations, many a Canadian city would be ill provided for. It would be very interesting to know how many persons take advantage of these comfort stations, who do not travel on the railway. The accommodation provided in this respect by many municipalities is, to say the least, scandalous. About a year ago The Sanitary Engineer referred to the lavatory accommodation at the Exhibition Grounds, Toronto, which is really abominable. If any railway company allowed their lavatories to get into the insanitary condition which recently prevailed in those at the Exhibition, the local health department would order them to be closed.

There are thousands of dollars wasted or poorly invested which might well be expended upon more public comforts, not only in Toronto, but in almost every city in Canada. If our health departments were only to exercise the authority vested in them by our various provincial health acts, we might have all the public comforts necessary. If they would take an example from the railway companies the public would not be slow to appreciate the good work.

Public comforts at one time, like the modern bathroom, were looked upon as luxuries, but just as the bathroom has come to be an absolute necessity, so are comfort stations, and plenty of them. Thousands of men visit not only the station buildings but also hotels for no other purpose than to take advantage of the lavatory accommodation which is provided. As one farmer's wife said, when prohibition talk was running high, "If they close the hotels, where will we get lavatory accommodation?" If pressure could be brought to bear upon our municipal governments to take notice and take an example from the railway officials, many of our cities would be far more healthy than they are at present.

If such accommodation is necessary to the welfare of the traveling public, there can be no doubt but that it is necessary for citizens who travel for hours on their feet, and no doubt often feel the necessity for such accommodation far more than those who are resting while travelling in a railway train.

SPEED UP

Motion, vigor, ginger, pep—whatever you wish to call it—what a great and mighty thing it is, and how badly it is needed on many a job and in every shop.

Speed up a little. Speed is good for the constitution. It irons the kinks out of the liver. It makes the digestive fluids of the stomach do their work. It rings up the curtain of the brain, making the mind clearer for the day's work.

Speeding up doesn't mean tearing around aimlessly or burning up your energy accomplishing nothing. When you make a move, be sure that your brain is behind it. Your body is a great machine, but you must have an engineer to run it. This engineer is your mind.

SOUND ADVICE

The following are a few good rules to lay down when starting in business, if you hope to make a success of that business.

1. Put in a cost system which will furnish you full and complete information about every transaction.

2. Do no work for which you do not secure an adequate net profit, allowing your cost system to prove the profits.

3. Keep fairly and squarely within the limits of your capital. Let your business grow out of its profits and not out of credit.

Don't undertake a contract for less than your cost system shows, nor without adding a fair profit, just because business is slack.

5. Don't deceive yourself into thinking a job has been executed according to agreement, either written or implied, if you yourself do not consider it satisfactory.

6. Don't try and collect the final payment for a job which does not satisfy yourself. It is bound to reflect upon your reputation and hang like a millstone around your neck.

7. But, when you are thoroughly satisfied that all is O.K., see that your account is paid promptly when due. Don't be anybody's banker but your own.

AN APPEAL ON BEHALF OF THE NATIONAL CANADIAN PATRIOTIC FUND

We have now entered upon the second year of the war, and the end seems as far off as ever. No one imagined, a year ago, that by September of 1915, *Canada would have sent across the Atlantic nearly one hundred thousand men with as many more to follow if necessary. This magnifient enlistment, while primarily due to the loyalty of our people, has been, in a large measure, made possible by the Canadian Patriotic Fund.*

This greatest of all the national benefactions is now assisting twenty thousand families of men who have enlisted for overseas service. These men have gone forward with the full assurance that the people of Canada will see to it that during their absence, their wives, widowed mothers and little children shall be maintained in comfort. We hear that the drain upon the Fund is assuming large proportions, that to meet the needs of July and August $700,000 *was expended, that the reserves are being materially decreased and that the National Executive Committee now finds it necessary to make a further appeal to the Canadian public.*

There are many funds, most of them worthy, but of them all the Patriotic Fund is the one we cannot allow to fail. It is the duty of the Government to arm, equip and maintain the troops. Not a dollar do the Federal authorities give to the Patriotic Fund. This work depends solely on the patriotism and generosity of our own people. Thousands of brave men are fighting our battles, believing that we meant what we said when we told them as they went forward: "Go and we will care for the wife and kiddies." It would be to our everlasting disgrace if our pledge were broken.

The national organization, with headquarters at Ottawa and branches or affiliated associations in every part of the Dominion, is worthy of our most generous support in the tremendous and ever-growing task that it has undertaken.

Ottawa, September 1, 1915.

A Chat About Clean-outs

Giving a Few of the Whys and Wherefores of the Cleanout, Their Faults, Failings and Other Shortcomings Along with a Few Practical Hints as to How Cleanouts Could be Improved—Many are as Every One of Our Readers Knows, Merely an Apology for the Name.

By The Trouble-Man Out West.

PART I.

THE need of access to drains for the periodical clean-out that in badly constructed drains, at least, is imperative, made itself felt soon after the introduction of those very necessary conductors of waste matters, and the "Dipstone" or mason's trap admirably answered the dual purpose of, first, preventing the passage of either foul or fresh air along the drain pipes, and so into the soil and waste pipes, and thence from the untrapped fitting into the chambers of the house, and secondly, giving access to the drain pipes on either side of the trap, when necessitated by their choking or stopping. (It also furnished a splendid bath of filth for rats to wallow in before entering the home).

This enterprise on the mason's part got the plumber's goat and he got busy and made a dipped pipe or "D" trap in lead, which he placed through the floor of the bath room, and brought all his branch waste pipes into his dipped pipe, and the foul smell that emanated from the overflow pipe of the wash basin did not assail one's olfactory organs to the same degree.

This bringing of the trap nearer to the fitting was a distinct advance in the sanitary world, but better was to follow.

It chanced that a certain great lady, of whose name and pedigree history unfortunately remaineth silent, had a practical turn of mind, and after noticing when visiting the house of a friend, that her delicate nasal senses were less afflicted when taking her Sunday scouring at her friend's washbasin than at her own, learned on enquiry that this beatific sweetness was achieved through the installation of this "D" trap.

On her return home, she recklessly informed her Lord (and Master) that, if he would command "Ye Plumber" to install one of these "D" traps on the waste pipe of her washbasin, she would in future perform her ablutions every day. His Lordship, having also (probably connubially caught) a practical mind, commanded the plumber to place the trap at the top of the waste pipe, next to the waste plug hole.

Now this lady had a ring of great value, and with this constant washing it got into the habit of slipping from her finger, and going down the plug hole into the trap, which necessitated the plumber being brought up from the dungeon in which he mysteriously built up and wiped together those pipes and traps of lead in which his heart delighted, or pieced up the wonderful lozenge-shaped casements of that new crystal sheeting called glass, which he leaded together and cemented with his soldering iron.

After making and soldering up several incisions in the costal regions of this washbasin trap, the plumber, who was full of labor-saving stunts, culled from the workshop kinks kolumn of the technical trade paper of his day intitled "Ye Plumbier & Glazier," made a nice round hole in the side of the trap, and procured from the house carpenter a nicely rounded plug of wood, which with a light, smart tap he drove into the hole in the trap, and behold, the first plumber's cleanout.

But alas, it came to pass in the course of time, that this wood plug became somewhat decayed, and essayed a sortie at a critical time, with the result that a portion of my lady's apparel was rendered, temporarily at least, unwearable, and she had not another pair immediately available.

This again played on my lady's practical mind with the result that the metal cap and screw, attached to a broken bottle that formerly contained some of those smelling salts so indispensable to the comfort of the great ladies of the period, was proffered by my lady for the plumber to solder into the position formerly occupied by the wood plug. As one or other of my lady's rings, earrings or other trinkets managed to get

(Continued on page 29.)

Heating and Ventilating Modern Hotels

Proving the Assertions Made From Time to Time That Sanitary and Heating Engineers Should be Consulted More in Designing Sanitary and Heating Equipment—That the Architect is Not the Right Person to Decide Such Matters.

By N. L. Schloss, Consulting Engineer, New York.

THE heating and ventilating system of the modern hotel is often unjustly criticized. This, in a great measure, is because the promoters and their architects underestimate the cost of the building. As a result the capacity of the equipment is reduced or some of the apparatus is omitted, while the parts of the hotel that appeal only to the eye are completed according to the architect's plan. The designing engineer must sacrifice the efficiency of the heating and ventilating system for rentable area, ceiling height and showy rooms, although if the system fails the entire blame is placed on his shoulders.

An architect should never prepare preliminary plans for a hotel without consulting an engineer with broad experience in hotel heating and ventilating. The contractors should not be asked to submit estimates until heating and ventilating requirements have been carefully studied. After the final plans have been prepared, the architect should arrange frequent conferences between manager, steward, chief engineer and consulting engineer, and settle all details of size and general arrangement.

Heating System Features

While the details of the central heating plant must be determined by financial conditions, it is good practice to have spare boilers, pumps and heater units. Water-tube boilers are desirable, although frequently the allowance for this part of the equipment will not warrant the expenditure.

If an electric plant be installed, there is usually exhaust enough for either low-pressure steam or forced hot-water heating. Before its discharge into the heating system the exhaust should pass through a grease extractor, and the condensation through feed water filters before being fed into the boilers. Unless these precautions are taken, the repairs for boilers and heating-system piping will be expensive. Where no isolated plant is installed, live steam at low pressure is used, the reduced boiler pressure being available for kitchen, laundry and water supply auxiliaries.

The heating system using forced hot water circulation gives satisfactory service, but does not admit of the same control as a low pressure steam-heating system. Special radiators require more space and cost considerably more to install. Steam-heating systems of the one or two-pipe gravity return type, will give fairly good results, but the vacuum return line system is thoroughly efficient, particularly where a light and power plant is installed in the building. Steam at pressures above or slightly below the atmosphere can be circulated, and the air in the steam and the water of condensation are automatically removed, thus eliminating air and return valves and all but one control valve.

The design of heating mains and returns depends somewhat upon financial considerations. An overhead heating main below the roof or around a service floor at the top of the house, with a pipe space for the returns between the ceiling of the public-room and guest-room floors, is an almost ideal arrangement, since it not only ensures effective circulation, but keeps the large risers for heating the guest rooms clear of the public rooms on the lower floors.

Systems of Radiation

Direct radiation for the public rooms is served from an auxiliary main and return in the basement or sub-basement. In many hotels the heating mains and returns are all installed in the basement or sub-basement and the up-feed system used exclusively. This creates many structural difficulties and does not give as good results as the down-feed system.

Direct radiation on the outside walls between the windows will satisfactorily heat the public, guest and other exposed portions of a hotel, and will take care of the wall and glass exposure and of any leakage caused by poor window construction. Hot blast heating and mechanical ventilation is expensive, difficult of control, and does not take care of down drafts and window leaks. An architect often designs a hotel, particularly the public rooms, without allowing for radiators of height, length and width for effective service. Windows running from the floor to the ceiling may be artistic, but from a practical point of view have no place in a hotel unless the owners will pay for a hot blast system of heating.

Radiators in the public room are enclosed, more for appearance than service, but in the guest room enclosed radiators become receptacles for dust, cigars and cigarettes and materially increase the maintenance cost of the hotel. Since many guests object to heat at night in the sleeping rooms, all heating risers and returns should be covered with some efficient non-conducting material and enclosed either in the walls or by fireproof partitions.

Radiator Control

Radiator control is, of course, an open question. Thermostatic control is no longer considered complicated or difficult to maintain, but its first cost is more than most owners will spend, regardless of the many advantages. A good vacuum return valve requires little adjustment, and is automatic under varying operating pressures. Its extra cost is often more than offset by the lower cost of the smaller pipes required.

A compromise for the thermostatic-control system is the so-called "modulating valve," with which a varying volume of steam is admitted to the radiator. Its cost is much less than that of the thermostatic, but is considerably more than that of the standard type of radiator supply valve. Since the modulated valve must be connected at the top, a hot water radiator is required, resulting in an unsightly construction unless the connection is enclosed.

Ventilation Features

The method of ventilating public rooms depends largely upon their architectural features. In rooms with flat ceilings the decorative detail should permit properly located ducts and registers of sufficient number and area. On the other hand, ventilation of a room with arched ceiling is a difficult and often a serious problem, particularly if space is not allowed between the false ceiling and beams for the register connections. It is then necessary to supply fresh air through a number of small ducts and register units, which create disagreeable drafts and hissing noises at the register.

If the arched ceiling does not provide sufficient space for ventilation, a flat ceiling should be used. Independent fan units are preferable for large dining, banquet and ball rooms. The duct and register system can then be more effectively designed and is, therefore, easier and more positively controlled. Another advantage of the independent unit is

that in case of trouble the ventilating service is only lost in a single room, which is not the case when a number of rooms are served from one large fan.

The ventilating apparatus for the laundry, kitchen and other rooms having heating apparatus should have liberal capacity. In these rooms the amount of air discharged should exceed the amount of incoming fresh air. Their exhaust, as well as that of the boiler, engine and pump rooms, should be powerful and direct. The insulation of engine and boiler room ceilings, while increasing the first cost, will materially reduce the ventilating requirements. In boiler and engine rooms it is necessary to install both frtsh air supply and foul air discharge near the ceiling and to take care of proper distribution by elbows or nozzles designed for each particular room. It is good practice to install in the boiler room adjustable air nozzles with permanent elbows just above or to one side of the smoke breeching at the rear of the boilers.

Air Filtering and Cooling

Fresh air should be thoroughly cleansed before being introduced into the building, tempered in cold weather and humidified as conditions require. Air washers have generally replaced the dry filters formerly used. The air is tempered and reheated in passing over wrought-pipe coils or cast-iron stacks before it enters the fan. Thermostatic control for the tempered air is absolutely necessary for the ventilation of public rooms.

The air is cooled either by spray water or by a stack of brine coils built in the casting of the fans. Which system is the more effective depends largely upon local conditions and the results desired by the management. A good air washer will remove over 90 per cent. of the dust and dirt from the air, but will not remove the odors frequent in waterfront cities at certain times of the year. The only sure way to remove these is by the use of ozonators.

The fans and fan-motor sizes for both air supply and exhaust ventilation should be figured liberally. A fan direct-connected to a motor makes a more compact and quieter equipment than a belted outfit, but costs considerably more. The direct-connected fan also requires a special slow-speed motor, whereas the belted type can use a standard motor. The direct-connected type requires a less costly foundation and is less likely to transmit noise and vibration through the building.

Changes of Installation

In recent years many hotels have been opened before the heating and ventilating system was completed, properly adjusted or tested. Instead of allowing for such conditions, quite frequently the system is pronounced a failure. After the system has been tested, there are too often changes in the air supply involving reconstruction or an entirely new system of mains and branches. The cost of these changes may easily be greater than that of the original system.

In a hotel recently built, the enclosing of risers and the unnecessary enclosing of radiators in guest rooms cost over $35,000. This change made necessary the substitution of hydraulic plunger elevators for those of the electric traction type originally specified. The elevator change created extremely congested conditions in the sub-basement and cost over $125,000. Changes in ducts, heating mains, returns and branches in this hotel, involving additional expenditures from $25 to $2,500, were common occurrences, all because sufficient space for the distribution of fresh-air supply, for the foul air discharge shafts and headroom for main and branch iron ducts were not provided.

To ensure an effective heating and ventilating system, efficient apparatus and devices should be selected, a responsible contractor should be chosen for their installation and the loyal support of all promoting the project should be given. Also, an essential requirement is a thoroughly competent engineer, whose duties should begin with the construction of the building. He should assist and co-operate with the architect and consulting engineer in the construction of the heating and ventilating system. He should not only give them the benefit of his practical experience, but should take over the plant, after its adjustment, test and acceptance, without the fault-finding of the operating engineer, hostile to everything he does not originate.

In Lighter Vein

PRACTICAL GRATITUDE

Mr. Editor,—I desire to thank the friends and neighbors most heartily in this manner for their co-operation during the illness and death of my late husband, who escaped from me by the hand of death last Saturday. To my friends and all who contributed toward making the last minutes comfortable and the funeral a success I desire to remember most kindly, hoping that these few lines will find them enjoying the same blessing. I have also a good milk cow and a roan gelding horse eight years old, which I will sell cheap. God moves in a mysterious way His wonders to perform. He plants His footsteps on the sea and rides upon the storm. Also black and white goat cheap.—Mrs. R. C. ——. Lapeer Co. (Mich.) Clarion.—Exchange.

HE SURE WAS A THIEF

There is a story told of the widow of a member of the craft who was visited by one of her friends. During a conversation, the visitor said: "Well, Mrs. Watson, you must excuse me if I have failed to call upon you as often as I might have done, but I can't help but confess that I was surprised that you married a plumber. You know, dear Mrs. Watson, plumbers are looked upon as being a very dishonest lot of people, and I could never prevail upon myself to visit you very often, knowing Mr. Watson was a man of that class. I do hope you'll forgive me, but I do sympathize with you; you must have had to put up with a lot."

"Indeed, I have had to put up with a lot," replied Mrs. Watson, "and every word you say is true. Mr. Watson was the most dishonest man I ever met. He and I have been married nearly twenty years, and he's gone and died without leaving me a cent. He never did a job without he robbed himself, and if he'd lived to be 100, he'd have done the same. He's robbed himself and every other plumber in the town by doing work too cheap, but I have at least one comfort, and that is, the good Lord will see to it that he doesn't do that in heaven. If poor Tom had only loved his neighbor as himself, it wouldn't have been so bad, but he loved them better, or else he'd have left me better fixed; and in spite of him being a good husband, I'll never risk another plumber. Poor soul," she continued, "he made himself poor that every speculator might be made rich. It was ever thus with plumbers."

THE MAN WHO WOULD NOT ADVERTISE

There was a man in our town,
And he was wondrous wise,
He swore by all the dogs that be
He would not advertise.

At last one day he advertised,
And thereby hangs a tale;
The ad. was set in nonpareil
And headed "Sheriff's Sale."

THE SANITARY ENGINEER

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OCTOBER 1, 1915

DON'T TALK WAR

OF all topics to avoid discussing the present war is the chief. That is in our business hours. Somehow or other quite a number of persons are very apt to accost one with "Well, what do you think of the war," or "I don't see that the British are doing very much. It seems to me they ought to have been in Berlin by now," and all such stuff as that.

Upon visiting a certain member of the craft in a small town recently, a traveler called in, and the very first thing he took up was, "Well, how's the war going?" etc., and before many minutes both the sanitary engineer and the traveler were thoroughly interested in the topic. Finally, the traveler looked at his watch and exclaimed, "By jove, I've got to get, I got a couple more calls to make before train time. What can I do for you this morning?" and after a very few brief words took his departure. Ten minutes after he'd left, the sanitary engineer said to the writer: "My word, I ought to have ordered so and so, but the war talk made me clean forget it. Oh well, I can mail the order."

Now, there is an object lesson, to not only a salesman, but also to a buyer. The salesman's house would receive an order, practically about the same time as they would receive a report, and circumstances would be rather contradictory, it would appear that the salesman had forgotten unless the customer explained that their Mr. Jones had called, etc., but the goods had been overlooked.

The duty of a traveling salesman to-day is to study up good selling talks, live ideas, which will not only pull business for employer, but also impress his prospective customer. Every call upon a prospective customer should be made of value to the person called upon. Just to illustrate our point: A traveler was in the train recently and overheard a conversation between two other passengers, which proved that one was not satisfied with a warm air furnace he had in his home and was considering whether to put hot water heating in this fall. The traveler noted the town these two got off at and before the train left the platform, made inquiries from one of the porters on the platform who the gentlemen were. Having got their names, he at once made a note of it and wrote to a sanitary engineer, in the town referred to, the whole story, along with prices on goods likely to be required, at the same time stating that he would call back on his return trip.

This resulted in an order. The sanitary engineer was first on the job, and was able to get full particulars, study them carefully and finally land the contract.

As we have stated many a time in these pages, true patriotism must be practical, and those who cannot for various reasons go to the front, should be doing all in their power to keep business moving, else when our soldiers come back, there will be no business. Therefore, let us all refrain from talking war, but rather talk business.

SANITARY ENGINEERS AND THE "BACK TO TO THE LAND" MOVEMENT.

THERE is no doubt that the "back to the land" movement, if it could be systematically and extensively carried out in Canada, would be of inestimable advantage to the people of Canada generally. The land never fails to give full value in return for whatever work is expended on it, as is seen by the abundant crops of almost every commodity which are the general rule this year.

When the war broke out, and the great wheat fields of Russia were practically closed to the market, when it was evident that by sowing more grain than usual a great crisis could be averted in the food-stuff market, farmers went to it in very earnest, sowed more grain and put still more land under cultivation, and what is the result?

Discussing the situation in the Toronto District this week, R. G. Dun & Co. say:

The crops in Canada have been abundant, and notwithstanding the much lower prices of wheat, it is estimated that the four important grain yields of the country are worth $485,000,000 this year or an increase of $108,000,000, as compared with 1914. This is an enviable situation, and will be a great stimulus to the business interests. Canada's exports for the first five months of the year ended August 31st also are most encouraging. They were over $200,000,000, while imports for the same period were $175,000,000, a favorable balance of $25,000,000 to the country. Merchants report a good sorting-up demand for merchandise, and travelers are doing better in the taking of orders for future delivery of goods. Stocks generally are limited, and prices in most case hold firm."

Now, there is no reason why sanitary and heating engineers should not share in some of this prosperity. But to do so they must go after it. Business which comes to one easily has generally a "string to it."

One member of the craft lately called at the office of The Sanitary Engineer and asked that his address be changed. Upon being asked the reason for the change he stated that he had moved his business into the country. Said he, "I've been in a city business for a number of years and recently took the advice of The Sanitary Engineer to get after the farmers for business. I got so much that I found it best to move into the country and I'm doing more business and better business than ever before."

This man is only one of the many who are adopting this course, and there is still room for more in the rural districts.

What Canada needs more than anything is more big villages and fewer big cities. Big cities are becoming too costly to keep up. Speculative builders and real estate men, men who are not producers, are the curse of this country. If sanitary and heating engineers begin to leave our large cities and assist in making farm life more comfortable, and rural residences more convenient, they will be doing a great service to the rural population. Speaking to one of our principal financial authorities the other day on this subject, he said that Canadian cities were becoming a big liability to the country, and quite agreed with The Sanitary Engineer's assertion that Canada needs more big villages and fewer large cities.

Now, it is a well recognized fact that no other craftsman can make such improvements to a farm or rural home as can a sanitary and heating engineer and with the installation of new machinery much labor can be saved on the farm, and farm and rural life can be thus made more attractive than city life.

Ask any ordinary city housewife whether she would rather live in a city or village providing she could have the same conveniences in a village home as she has in the city and there is no doubt but that she will choose the village, with its free air, and less of the bewildering bustle and turmoil.

All such arguments go to prove that the sanitary and heating engineer can become one of the greatest factors in bringing about a real and beneficial "back to the land" stampede, which would not only be a benefit to themselves, and to those who leave the cities to take up farm life, but would also increase the efficiency of the present farms in no small degree.

The success of our great railway systems is not due to the large cities long distances apart said one of our railroad authorities because we have big weights to haul long distances. We would far rather be dropping our loads at small places and picking up more goods on the way." This means that more big villages would solve that very problem, and big villages can only be made possible by making them as comfortable and convenient as large cities.

THE SEVEN WONDERS OF THE WORLD

The man who will work without being watched.

A sales manager who doesn't think he pays the old man's salary.

A salesman who thinks that perhaps the quality of the material may have something to do with his making those large contracts.

A stenographer who knows punctuation, and will look in the dictionary when she is uncertain about the spelling.

A purchasing agent who doesn't think he does you a favor when he asks you to quote.

A new superintendent who will wait a week before installing a much better system than his predecessor.

A boss who acts as if he wasn't.

EDITORIAL NOTES

IF YOU have real sterling abilities and know your business from A to Z, don't hide your light under a bushel. Advertise!

* * *

THE GREATEST financial successes of the day have been brought about by advertising.

* * *

GET IN ON the "back to the land movement." Assist in the building up of big villages and at the same time remember that if you would be generous, you must be just, and don't contract to do work with other folks' material at less than cost.

* * *

EVERYTHING has its price. Let those who receive "the everything" pay the price.

* * *

SANITARY AND heating engineers are more apt to give away the goods and pay the price for them too.

* * *

WE SHOULD all love our neighbor as ourselves, but we don't need to love them better and thus become bankrupt.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

ARTICLE 13

Surface or Intermittent Springs

IN the previous article certain conditions that give rise to what are termed surface springs were noted (see Fig. 28). The more usual case is shown in Fig. 29. At a point on the side of a hill or on the side of a valley the rain water percolating through the porous soil or rock may be stopped in its downward flow by a layer or stratum of impervious formation. Numerous small springs may then occur, as shown at A and B scattered along the "outcrop" of the impervious formation.

It is evident that the volume of water yielded by surface springs depends upon the surface area drained and upon the percentage of rainfall that gets into the soil. Hence during drought the flow in a surface spring may be very small or entirely disappear. A surface spring is for this reason also termed intermittent.

Deep-Seated or Permanent Springs

In the case of surface springs the water is always flowing through pervious material from a higher to a lower point. In the case of deep-seated springs, however, the pervious water-bearing layer or stratum is covered by a stratum that is generally impervious (Fig. 30). The water travels through the porous stratum, and when it reaches the lowest point accumulates until there is sufficient pressure to force it through some weak point or fissure in the otherwise impervious stratum. The water from such a spring flows out under pressure. It is more constant in flow and not so quickly affected by variations in rainfall and is therefore termed permanent as compared with surface springs.

Wells

Wells such as those shown in Figs. 28 and 29 get their water from a porous surface stratum and are termed shallow wells. The water may stand in such wells within a few feet of the surface of the ground, and as a rule they are not very deep—hence the name.

If a well is sunk to a porous stratum covered by one or more impervious strata it is called a deep well (Fig. 30). Deep wells are generally but not necessarily better than any of the "shallow" wells, and hence the name.

The term artesian is sometimes generally applied to deep wells, but it relates more specifically to deep wells from which water will flow without pumping. As can be seen from Fig. 31, an artesian well is an artificial spring flowing under pressure. Under ideal conditions the water would, theoretically, rise as high as the hydraulic grade line AB.

It should be noted that as far as pumping is concerned, deep well pumps are necessary when the surface of the water in the well is more than about twenty-five feet from the surface of the ground whether the well is, according to the classification in this article, a surface or "shallow" well or a "deep" well. In the case of a deep well pump, the pump cylinder is generally lowered through the suction pipe to the bottom of the well and operated by a connecting rod reaching to an engine above the surface of the ground, or the power may be supplied by hand.

Fig. 32 is drawn to show why a well sunk near another which latter always yields a plentiful supply may itself get little or no water. In the changes that have taken place and to a less extent are now taking place on the earth's surface, it sometimes happens that for certain causes the strata have broken and slid past each other. The result may be a fault as shown in Fig. 31. The well at B may thus be completely cut off by an impervious stratum from the water-bearing stratum which supplies well A.

In granites and similar rocks which ordinarily do not contain enough water to supply a well there may be joints or cracks. It has been found that where joints exist some are nearly vertical and act as channels for the admission of water. Others are horizontal, the cracks being only a few feet apart at the surface and these horizontal joints act as small reservoirs. In a granite formation with such a system of joints a well may be sunk (to a depth seldom exceeding 50 feet) and found to yield a sufficient amount of water. Near such a well it is quite possible, however, that another well would yield practically nothing, the cracks in the granite not extending to it.

Sanitary Inspection of Water Supplies

The object of a sanitary inspection is to gain a knowledge of the source of a water supply and to determine whether there is a possibility of pollution at the source or at any point thereafter before reaching the consumer.

In areas that are inhabited, organic refuse of human, animal or vegetable origin is generally found on the surface of the soil. All refuse may become objectionable from a health standpoint, but the more dangerous refuse is that generally associated with human existence. The danger lies in the fact that disease bacteria may be washed by a rain from the surface of the soil into streams or rivers used as water supplies. In the case of sewage, it is unfortunately sometimes directly emptied into such bodies of water. The part of the rainfall that percolates into the ground also carries with it disease bacteria. In the autumn, typhoid fever may therefore be more prevalent because a copious supply of rainfall washes the surface impurities and bacteria down to deeper strata from which drinking water may be drawn.

The important diseases that may be carried by water are typhoid and cholera; the less important are dysentery and cholera infantum. These are all intestinal diseases, the infection being caused by the bacteria that leave the body with the excreta gaining a way into the drinking water and thence into the intestines of the next victim who is not strong enough to resist the disease.

Cholera is an Oriental disease and not much feared on this continent, but typhoid is a disease that is much too prevalent and one that must be continually fought. It is the disease that sanitary engineers must be devising ways and means to prevent. One of the best means is, of course, to prevent the pollution of water supplies. On the other hand if a water supply is contaminated a sanitary inspection should aid in showing its condition so that an alternative supply can be obtained or the water filtered.

Absolutely pure water, it should be noted, practically cannot be found. Water is such a solvent that it absorbs gases from the air and salts from the ground. Many of the substances dissolved in water are not, however, objectionable either as to appearance, taste or from the standpoint of health. The thing to be most desired is to have the water

pure, in the sense that it is free from objectionable bacteria.

A knowledge of the geology of a water supply or the character of the stratum from which the supply is derived is evidently of value in a sanitary inspection. The deeper a water percolates or flows through deep strata the more filtered it becomes. As a rule, deep-seated springs and deep wells are free from disease bacteria. The possibility of pollution of different sources of water supply and the precautions that are advisable in some cases will now be discussed.

Surface Water

Surface water from highland regions or uncultivated areas may be found quite pure, but surface waters from inhabited areas, as already pointed out, are liable to be polluted. In making a sanitary inspection all the area from which the surface water is collected should be inspected and the location of dwellings, outbuildings or refuse heaps noted.

Surface waters pure at their source may be contaminated by sewage or refuse while flowing as rivers or in lakes, and such facts should be also carefully noted.

Springs (See Figs. 29 and 30)

The water from a surface spring is more liable to be polluted than that from a deep-seated spring, as in the latter case the water may be filtered through long distances (in some cases miles) of sand or gravel. This filtering purifies the water in every way and removes the bacteria. Or if some of the bacteria should not be removed it generally takes so long for the water to travel from the point where it enters the water-bearing stratum that the bacteria are all dead.

It is an advantage to place concrete around the place where a spring flows out of the ground because it prevents it being polluted at this point and also a reservoir may be made to average the flow if the spring is intermittent.

Wells (See Figs. 29, 30 and 31)

As in the case of springs, surface wells are more likely to be polluted than deep wells because the extent of filtration in the former case may not be sufficient to effect purification. There are, unfortunately, reasons why in some cases deep wells also may be contaminated. There is always the possibility of water percolating to considerable depths through cracks or channels in the rocks. A case is known in which a well was contaminated by the impure water of a brook a mile distant. The water came through an unsuspected underground channel without being filtered. Even deep wells, therefore, located in the midst of a population must be regarded with suspicion, as they are liable to pollution. There are certain precautions that can, however, be taken. Deep wells are generally bored, and by lining the bore of the well with water-tight pipe for some distance the surface water can be excluded. The area around the well should be enclosed and kept clear of decaying matter. From what direction the well is fed may be surmised if the geological formation is known and probable sources of pollution can be investigated.

The wells most exposed to contamination and consequently responsible for many of the outbreaks of infectious diseases are the surface or shallow wells to be discussed in the next article.

(Continued in next issue.)

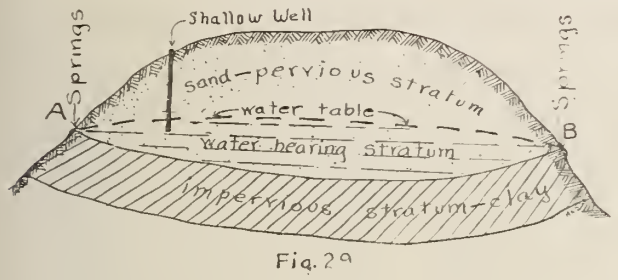


Fig. 29

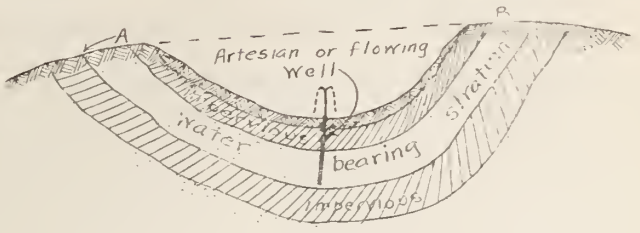


Fig 31

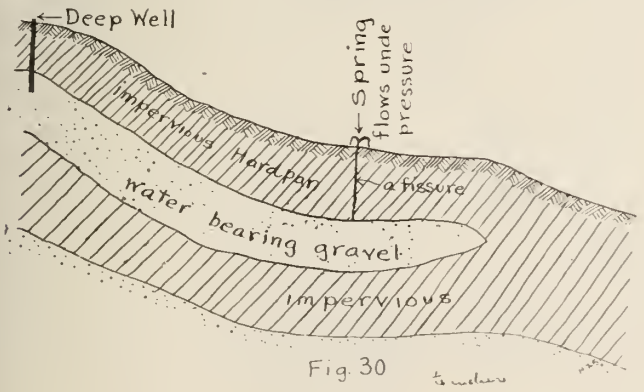


Fig. 30

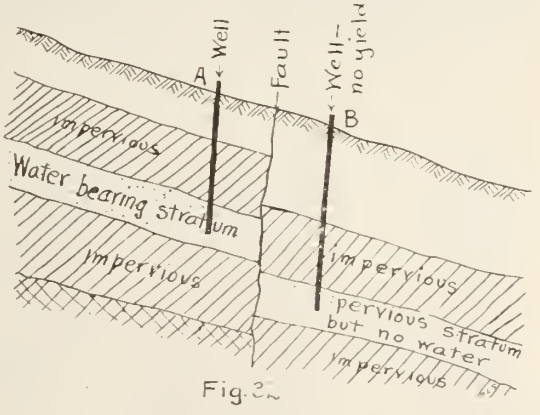


Fig. 32

NEW BOOKKLETS

The Vici Radiator Company, of Hamilton have issued a very interesting booklet of over 30 pages, describing their new radiators. The book also includes some very interesting figures as to what can be done by adopting the Vici radiator. These booklets may be procured free upon application to the above address.

NEW SEWAGE DISPOSAL SYSTEM

The Kaustine Co. of Canada are distributing some very interesting literature describing their new method of sewage disposal.

The system consists of steel receiving tank and agitator, w.c. bowl and ventilation pipes, and is claimed to be suitable when septic tanks cannot well be constructed.

There is a chemical used to break up the solids, which finally become a semi-fluid, practically odorless.

Further information may be had from ahe above company, 523 West Marion street, Parkdale, Toronto.

Practical Course for Sheet Metal Workers

ARTICLE No. 23 OF SERIES

By CHARLES SEIVERS

IN article and plate 20 we described how the patterns for the branches off a main pipe should be developed, and would that our readers refer to Plate 20 so as to see the relation between the two plates, viz., 20 and 23.

The plate accompanying this article shows the various diagrams necessary to develop the patterns for the holes in the main pipes. It will thus be seen that articles number 20 and 23 show the completed pipe and branch patterns.

In Fig. 1, to develop opening, lay out the portion of pipe as shown by D C E F, the distance between D E and C F being equal to distance between D E and C F on side elevation.

On the circumference of section at O, the spaces between M and N are the points where divisions of branch intersect; measure these spaces with dividers or compasses and set off on D C of main pipe, then draw lines from these points at right angles to D C, joining them to E F.

With the line I X on side elevation as a base to measure from, measure the distance from D C to I X, and set off on main portion of pipe as shown by X I; this gives a corresponding point on pattern from which to set off from. Now measure from the line I X on elevation to outer sides or points 5 on branch (in this case being a square branch, both sides are equal), and set off on both sides of line X I, on line drawn from points numbered 5. Now, measure off distances to the points 4, 3 and 2 and set off from X I in similar manner, the points I and X being on same line on elevation. The intersection on pattern is point required. A line drawn through to the points thus obtained will give outline of opening required.

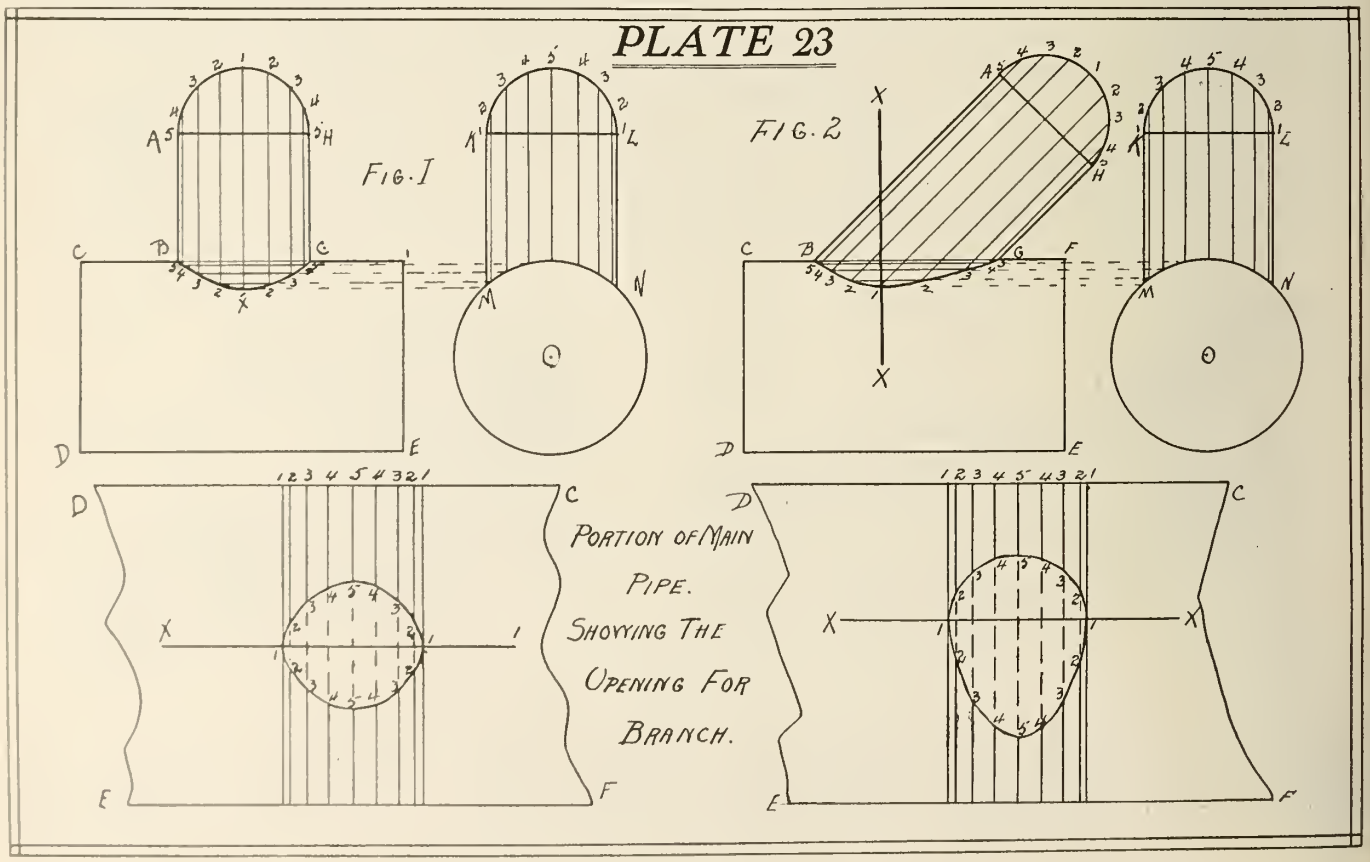
While in this instance the centre line of branch has been used as a base line to work from, the point to keep in view is that while the spaces from M N on section give the points on the circumference, that the divisions from section of branch intersect, and the distance between 5-5 4-4, 3-3, 2-2 and point I at B X G of elevation is the width of the opening at each of these points.

In Fig. 2 the portion of main pipe and the spaces are laid out in same manner as described above. In setting off the distance between points, 5-5, 4-4, 3-3, 2-2 and point 1, we can work from line C D or from line F E, or any line between them drawn parallel to them, as X X.

If the line X X is used, the distance from C D to X X on elevation should be set off to correspond on the pattern, as shown by X X.

Takes New Position.

Peterboro, Ont.—J. C. Birmingham, one of the managers of the Peterborough Hardware Company, is going to leave the city about April 1, for Campbellford, where he has taken an important position with the Dickson Bridge Company, with whom he was connected before coming to Peterborough. During his stay of nearly two years in this city Mr. Birmingham has established a wide circle of friends for himself who will be sorry to see him go, but who will wish him all success.



Activated Sewage Disposal Experiments

The Writer of the Following Article Obtained Authority From the City of Regina to Install a Small Plant for the Purpose of Trying Out the Latest Method of Sewage Treatment. The Article Describes the Result and How it Was Obtained.

By R. O. Wynne-Roberts, Temple Building, Toronto.

As consulting engineer to the City of Regina, the writer obtained authority to install a small plant for the purpose of trying out the latest method of sewage treatment. The illustrations given below show two tanks, each 4 ft. 7 in. in diameter and 6 ft. deep, made of light galvanized iron. Each tank had a narrow window to enable the observer to see what was going on inside. It will suffice to describe No. 1 tank and its fittings. A small Ford automobile engine, seen on the right, was converted into an air compressor, and this was driven by an electric motor. The air was pumped into an air receiver made from an old steel gasoline barrel, and then led by pipes to No. 1 tank on the left. Figs. 2 and 3 shows the details of the tank. Three lines of ½-inch pipe were perforated with holes, 1/64th inch in diameter at 6-inch centres, and had canvas sleeves drawn over them to cause the air to spread. The central bottom opening was for the discharge of the sludge. Sewage was pumped into the tank, and the effluent syphoned out by movable pipes.

Fig. 4 shows the way in which the air was measured. As will be seen by the sketch, the air pipe line had an enlargement, and in it was fixed a thin brass plate with a central circular hole. Above and below the brass plate diaphragm there were connections made to two legs of a water gauge similar to those used to measure the pressure of gas. When the air was pumped under a small pressure it passed through the circular hole in the diaphragm, and in doing so the pressure on the top side was less than on the lower side. Consequently the lower side pressure would force the water in the right-hand gauge glass below the middle line, and, therefore, force it above the middle line in the left-hand gauge glass. The difference in level between the water line in the two glasses represented the loss of air pressure, due to the obstruction of the diaphragm, and with this information it was possible to calculate the quantity of air pumped. Where gas meters are available they can, of course, be used instead of a diaphragm.

The activated sludge process is simple in one sense. It consists of blowing air through sewage until it is purified. This, in the first trial, takes about six weeks. Then a quantity of the water is syphoned out, the sludge kept back, and fresh sewage mixed with it. This is air-blown until it has lost its impurities. By repeating the process time after time, until the sludge amounts to about 25 per cent. of the capacity of the tank, the sewage can then be purified in three or four hours instead of six weeks.

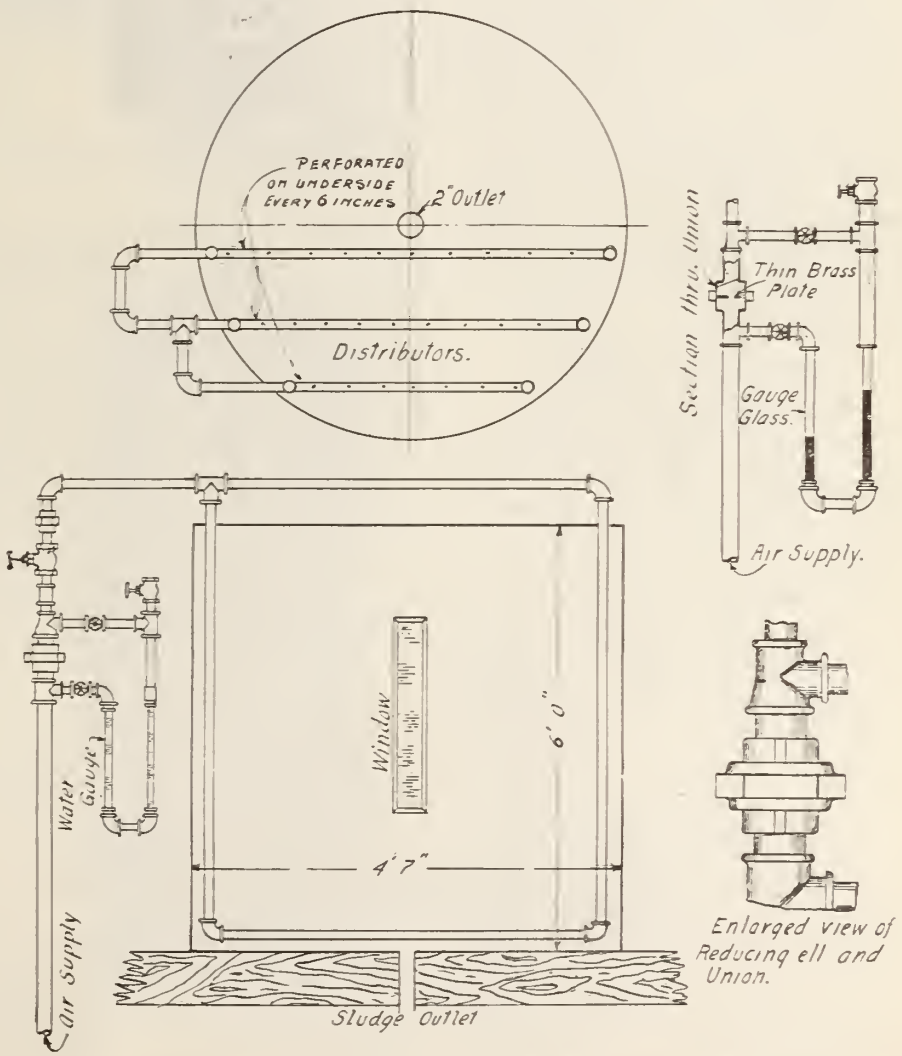
The sludge must first be made active by blowing air; it will then be somewhat like yeast is to flour; it must be thoroughly mixed and allowed to do its work.

This method is being tried in many English towns and American cities, and promises to purify sewage more effectively than can be done by any other of the present systems.

Some experiments were started some time ago by the Ontario Provincial Health Department at the Toronto Testing Station, but the war has disturbed the work. It is to be hoped that some of the enterprising towns in Canada will start experiments along these lines. The cost is small, whilst the information to be gleaned will no doubt be valuable.

Note.—We referred in last issue of The Sanitary Engineer to an address given by G. W. Fuller, of New York, before the Canadian Public Health Association, on Modern Methods of Sewage

(Continued on page 29.)



Details of experimental plant used in Regina in connection with activated sewage disposal methods.

New Sanitary and Heating Goods

NEW PROCESS FOR LEAD JOINTS

A new material called "amalgaline" has been introduced in England for making joints between lead surfaces, and it is said to have been widely adopted by shipbuilders in Scotland and the north of England, as it is used in flanging and the seaming of lead used in lining refrigerating chambers.

The system is not confined to use on small pipes, but is used in an ordinary way on pipes varying in bore from $\frac{1}{2}$ inch to 9 inches. It is an autogenous process, but instead of using an intense local heat the fusion is effected by the action of the amalgaline on the surfaces to be welded, forming an amalgamation between the lead of the flange and the lead pipe.

The material is in the form of a metallic ribbon 0.002 inch thick, practically a pure metal, which, when placed between the surfaces of lead and subjected to heat, fuses at a temperature of 160 degrees lower than the actual fusing point of lead—and in fusing it causes the lead surfaces to run together at a lower melting point than that of the body of the lead. This running together has an autogenous effect, and the minute particles of amalgaline are dissipated into the body of the lead, which, by reason of the absorption, becomes stronger at the joint than elsewhere.—Engineering Digest.

DESCRIBING UNIONS

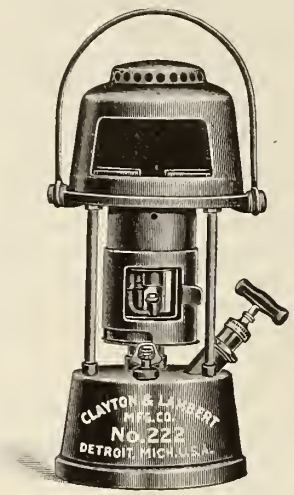
No fitting used in the fitting up of pipes can result in as much trouble as a union, if it's a poor one, and it requires a certain amount of practical experience to be able to judge a good one from a poor one.

The Dart Union Co., Ltd., have just recently published a very useful booklet bearing upon this very question. It is finely illustrated, and shows all manner of union couplings suitable for every possible requirement.

These booklets may be procured free from the Dart Union Co., Ltd., Toronto.

No. 222 KEROSENE FIRE POTS.

The Clayton & Lambert Mfg. Co., Detroit, Mich., have recently introduced their new No. 222 Kerosene Fire Pot shown in the accompanying illustration. It is claimed by this Company that they have never experimented at the expense of the user and that the No. 222 is fully up to their usual high standard of quality and efficiency. The burner has several new and improved features and generates the maximum heat from kerosene producing, it is claimed, perfect combustion and burning without odor or smoke. Air pressure is produced in the tank by means of a powerful compound pump. This air pressure can be instantly released when desired to extinguish the flame by means of an air valve screw in



Clayton & Lambert No. 222 Kerosene Torch.

the filler plug. A cleaning needle is supplied free of charge and can be used for cleaning any part that may become clogged from impurities in the fuel. The tank is made of seamless drawn steel and all fittings are welded in making it extra strong. The steel hood is removable and large enough to take a pair of large size soldering coppers. The makers say that this style is designed especially for tinner's and roofer's use for heating irons or melting metal babbit, or solder or bending pipe. A complete line of kerosene, gasoline and alcohol torches and fire pots is shown in their booklet "M" which will be mailed to those interested.

NEW W.C. FLUSH VALVE

It will be of interest to our many readers to learn that the H. Mueller Mfg. Co., of Sarnia, have secured the Canadian manufacturing rights for the "Hydraulic Flush Valve," and are manufacturing this Flush Valve in their plant at Sarnia, Ontario.

We are showing this only in the type for Low Down Closet Tanks, but it is also made for Elevated Closet Tanks and Automatic Urinal and Closet Tanks.

The above named valves are the same design, the only difference between the High and Low type being the height of the valve and size of the outlet. The Automatic Valve is without the Lift Wire, this not being necessary.

The "Hydraulic" Flush Valve was designed to eliminate the annoyance and expense of repairs experienced by those dealing in rubber ball valves.

This invention relates to a combined valve and siphon particularly designed for flushing tanks of water closets, urinals, etc., and has for its general object, to provide a device whereby siphonic action will be initiated automatically and which may be employed for manual actuation, while insuring that in the latter case operative conditions are not disturbed.

There is only one moving part to the Hydraulic Flush Valve, and that is the Leather Diaphragm. There is absolutely no strain on this, and when proper leather is used it will last as long as the brass parts themselves; there is positively no strain or suction on the diaphragm, the valve is at all times held closed by the weight of the water. The diaphragm is held between two brass washers, the upper one being the wider, and reaches entirely over the seat of the valve when closed, and thereby absolutely prevents any suction from injuring the leather diaphragm. There is positively no strain on the leather diaphragm when the valve is open, by the fact that the upper brass washer will hit against the dome at the proper height.

The bottom brass washer is smaller and enters the spud of the valve comfortably and is used only for making a rigid joint. This is accomplished by the fact that the operating stem is screwed through both of these washers.

The dome and spud of this valve is made of cast brass, whereas the overflow and siphon pipes are made of heavy brass tubing. That you may readily see the simplified operation of this valve we will endeavor to describe same fully.

As the tank fills, water enters the dome through the opening around the stem in the centre of the dome, thus filling the valve chamber and also the siphon tube to the level of the water in the tank. The ball cock is adjusted so that the water level is at any point below the top of the overflow pipe. The overflow pipe is only used ordinarily as a means of taking care of the refill from the ball cock and the water level must be below the top, otherwise the valve will act automatically.

The action of the valve when the tank lever is operated is as follows: it will lift the stem which lifts the diaphragm, thereby forcing the water contained in the valve chamber into the siphon tube and starts siphonic action and will take the water out of the valve chamber faster than it can enter through the opening around the stem, thereby creating a partial vacuum; the diaphragm will remain up until the air strikes the opening around the stem, then the syphon will break, the valve closes, and the tank is again ready to fill.

The leather diaphragm is made of the highest quality leather obtainable, and should the water be let out of the tank and diaphragm allowed to become dry, the leather will NOT crack, but will work again as soon as soaked up, which takes three or four minutes.

Should the ball cock by accident or design continue running, the water in the tank will rise to the top of the overflow pipe and then the valve will act automatically and empty. This feature in itself is considered of great value, as it will not allow the tank to overflow, and will always act as a tell-tale when the ball cock is leaking, and thus calling as it will the occupant's attention to the fact that something is wrong, the plumber is called, the defect is remedied and no damage results from a possible flooded bathroom and the water is not wasted to the same extent as it would be ordinarily by the continual running of the water through the over-flow pipe. This running water is not noticed particularly because of the leak being so small, but in reality is a great waste of water, which fact will be particularly appreciated by those whose water supply is metered.

The hydraulic valve can be used as an operated or an automatic valve in either high or low tanks; it can be used either as an operated or an automatic valve or as both and at the same time.

The automatic feature above referred to is accomplished by the fact that the water rushing down the overflow pipe draws the air out of the siphon tube and thereby relieves the pressure in that tube or in other words, creates a vacuum and instantaneously the leather diaphragm rises off its seat to the top of the dome and remains in that position due to the fact, as stated before, that the siphon tube will take the water out of the dome valve chamber faster than it can enter around the stem and the diaphragm will remain up in position until the air strikes the opening around the stem, then the siphon will break and the valve closes.

The H. Mueller Mfg. Co., of Sarnia, Ont., will be glad to furnish samples and any particulars desired respecting their "Hydraulic" Flush Valves.

New Hydraulic Flush Valve

New Pumping Unit

A NEW PUMPING UNIT

Very few lines have made such progress within recent years as the pneumatic water service system. Thousands of dollars have been expended in making extensive experiments and procuring maximum service at the least possible cost. The National Equipment Co., Wabash Avenue, Toronto, deserve great credit for the results which they have achieved by their new 500 series. They claim they can deliver 250 gallons of water per hour by the use of a $\frac{1}{4}$-horse power electric motor.

The pump is unique in construction in that, while it is a double-acting pump, it has only two valves. The cylinder is given what is known by expert engineers as a mirror finish, thus increasing as well as ensuring the very best service. Every part is substantially built. It is self-oiling in all its bearings, and as far as can be learned no step has been left unturned to ensure a high-grade pumping system at a reasonable price.

Further particulars will be furnished upon application to the above company.

NEW PROCESS FOR MAKING LEAD JOINTS

A new material called "amalgaline" has been introduced in England for making joints between lead surfaces, and it is said to have been widely adopted by shipbuilders in Scotland and the North of England, as it is useful in flanging and the seaming of lead used in lining refrigerating chambers.

The system is not confined to use on small pipes, but is used in an ordinary way on pipes varying in bore from 3 inches to 9 inches. It is an autogenous process, but instead of using an intense local heat, the fusion is effected by the action of the amalgaline on the surfaces to be welded, forming an amalgamation between the lead of the flange and the lead pipe.

The material is in the form of a metallic ribbon, 0.002 inch thick, practically a pure metal, which, when placed between the surfaces of lead and subjected to heat, fuses at a temperature of 160 degrees —lower than the actual fusing point of lead—and in fusing, it causes the lead

(Con. on p. 29.)

Principles of Modern Air Lift Pumps

A Brief Outline of a Type of Pump Which is Being Widely Adopted Where Conditions are Suitable. In Common With Many Other Successful Appliances, its Action is Based on Well-Known Physical Laws

Reprinted from Power House

THE adoption of air-lift pumps is becoming more general as knowledge of their advantages spreads amongst pump users. The development of this type of pump is comparatively recent, and the principle on which it operates and the efficiency obtainable render it of interest to manufacturers in every industry. Briefly stated, the air-lift pump is an apparatus whereby air at a suitable pressure is continuously introduced at the lower end of a column of water. This column of water is contained in a pipe known as the discharge or eduction pipe, and it in turn is surrounded by the water in the well or other source of supply. From the upper end of the discharge pipe, the water with the entrained air is piped away in any suitable manner. The device by which the air is allowed to enter the column of water is the essential part of the apparatus, and is commonly referred to simply as the pump. This is the vital part of the whole scheme, and unless it is designed in accordance with known hydro-pneumatic laws, and installed with a full knowledge of conditions and their results, the successful operation of the installation may be seriously interfered with.

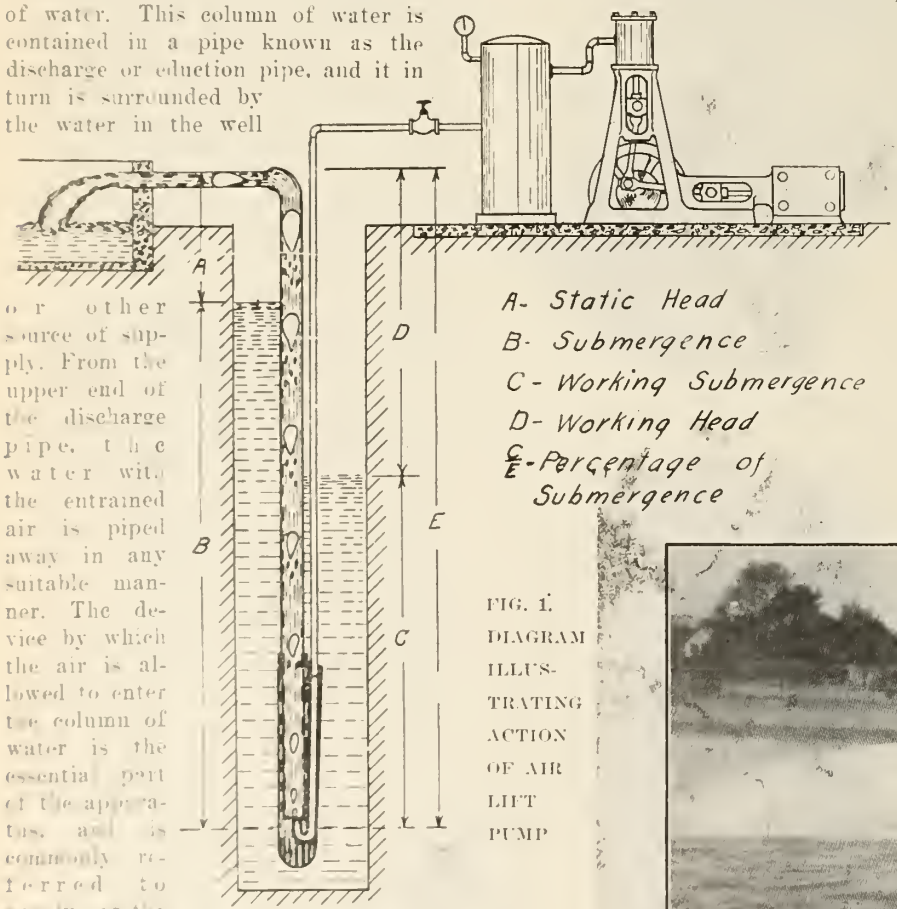


FIG. 1. DIAGRAM ILLUSTRATING ACTION OF AIR LIFT PUMP

The Pump and Its Work

The duty of the pump, then, is to force the air into the column of water. The quantity of water displaced by a given volume of air would now raise the level at the top of the discharge pipe by an amount proportional to the quantity of air admitted. When this air entered the column, the weight of the column would be increased by the weight of the air. This would mean that a column of unit height to which a unit volume of air had been admitted would immediately rise at its upper end. The amount of such rise being equal to the added volume of the air, less the volume of water equal in weight to half the volume of air. In practice the weight of the air could be neglected, but is mentioned as a theoretical factor. If more air be admitted, the weight of the column remains practically the same, while its volume is still further increased. Fig. 1 illustrates in diagrammatic form the behavior of the air and water. When a continuous stream of air is liberated under water its behaviour is similar to that of a waterfall in air. Just as a body of water breaks up after falling a considerable distance through the air, so a stream of air breaks up when rising through a body of water. If the stream of air were supplied under great enough pressure, in a confined column, it would be unbroken, but in Fig. 1 the air pressure is only slightly greater than the water pressure, due to submerged head C.

The air consequently leaves the nozzle in bubbles which begin to expand as they rise nearer to the top of the column, and are subject to less pressure. While the diagram shows these bubbles separately for sake of clearness, they actually break up more the longer the distance they have to travel, until in the case of a very high lift, they are fairly numerous and of comparatively small size. This fact does not impair the efficiency of the pump, as the displacement of water is equal for the same quantity of air, whether in the form of one large bubble or several small ones.

The column of water, therefore, continues to rise as the air enters, until it passes the upper end of the discharge pipe. From this time on, the pump will continue discharging, because as the next bubble enters and causes a corresponding overflow of water at the top, the weight of the column will be reduced below the point necessary to balance head of water C. Consequently a quantity of water of sufficient volume to replace the overflow will be forced into the

FIG. 2. DELIVERY FROM 6-IN. AIR LIFT PUMP.

lower end of the pump, due to pressure from head C, this action continuing so long as air and water are available. The presence of air in the water is plainly noticeable in the picture, Fig. 2, which shows the delivery from a six-inch pump

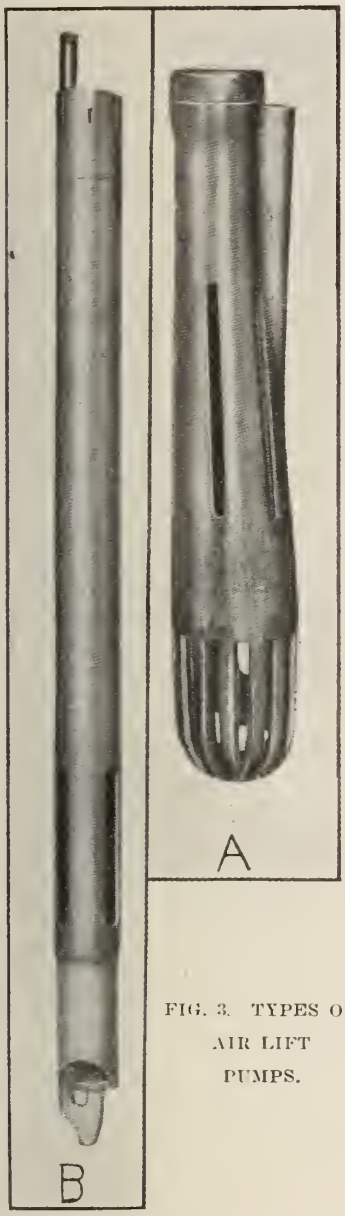


FIG. 3. TYPES OF AIR LIFT PUMPS.

operating under average conditions. The air bubbles are thrown well forward of the main body of water, carrying small bodies of water with them in the ferm of heavy spray.

Regarding Efficiency

A consideration of the principles involved shows that air-lift pumps require as an essential part of design, a correct ratio of submergence to lift, and size of discharge pipe; and a volume of air determined by the amount of water, percentage of submergence, and height to be lifted.

Well-designed plants working under good conditions, have shown an efficiency of between 62 and 63 per cent., based on a comparison of the actual power input at compressor, with the actual amount of water lifted. Much higher efficiencies have been obtained on occasion, but an overall efficiency of 40 per cent. is easily obtained with properly designed installations. The maintained efficiency of air-lift pumps which is an inherent feature of the apparatus, is not the least of many desirable conditions. For instance, a number of separate wells within reasonable distance can be operated from a central compressing plant at a plant investment very much less than separately-operated mechanical pumps would require. The pumps themselves do not break, because there are no moving parts to cause trouble, and in cases of water supply, the aeration which takes place renders the water suitable for immediate use.

Depth of Lift

Wells of very considerable depth and height of lift can be pumped successfully with air-lift pumps when the necessary ratio of lift to submergence can be obtained. In some cases more than 1,500 feet lift has been successfully accomplished.

One style of pump is shown at A, Fig. 3, where the discharge line is surrounded by a body of water in a well casing, as in Fig. 1. Where the well furnishes sufficient water to allow the well casing to act as the water discharge line, the type of pump shown at B, Fig. 3, is adopted, the diameter of the casing being equal to that of the casing being equal to that of the well.

the water-level to the air-lift pump while the pump is not working.

Working Submergence, C, is the distance from the water level to the air-lift pump while the well is being pumped. This is nearly always less than the ordinary submergence, and is the distance which must be considered in determining the proper location of the pump in the well, and in calculating the amount of air necessary to move the required amount of water.

Starting Pressure is the air pressure in pounds per square inch necessary to start the well flowing, and is ascertained by multiplying the submergence in feet by .434 plus an allowance for pipe friction up to about 5 lbs. per squ. in.

Working Pressure is the air pressure in pounds per square inch necessary to keep the well flowing, and is ascertained by multiplying the working submergence by .434, plus one pound per 100 feet of properly-sized air-line.

Static Head, A, is the distance from the point of discharge to the surface of the water when the well is not being pumped. This distance must be known in order to determine the starting pressure.

Working Head, D, is the distance from the point of discharge to the surface of the water when the well is being pumped. This distance must be known in order to determine pump location and working pressure.

Free Air is the required volume of air at atmospheric pressure necessary to operate the pump. All calculations for

TABLE I.—ECONOMIC CAPACITIES OF AIR LIFT PUMPS BASED ON ACTUAL TESTS*

Size of pump and discharge pipe	PERCENTAGE OF SUBMERGENCE. 65 to 70% Gallons per min.	60% Gallons per min.	50% Gallons per min.	40% Gallons per min.	33⅓% Gallons per min.	Minimum size of casing	Minimum size of air line
1 in.	10— 15	10	9	8	6	2½ in.	¼ in.
1¼ in.	15— 25	15	13	10	8	3 in.	⅜ in.
1½ in.	25— 38	25	25	15	10	3½ in.	½ in.
2 in.	50— 67	45	40	30	20	4 in.	½ in.
2½ in.	65— 85	60	50	45	35	4¾ in.	¾ in.
3 in.	120— 165	110	95	70	50	5¾ in.	¾ in.
3½ in.	160— 275	150	125	90	70	6 in.	¾ in.
4 in.	225— 325	200	170	125	90	6¾ in.	1 in.
4½ in.	275— 400	250	210	170	120	7¾ in.	1 in.
5 in.	350— 600	320	260	200	150	8 in.	1 in.
6 in.	550—1000	450	380	300	200	9¾ in.	1½ in.
7 in.	750—1200	650	550	425	300	10¾ in.	1½ in.
8 in.	1000—1500	800	675	525	400	11¾ in.	1½ in.
9 in.	1250—2000	1070	900	700	500	13 in.	2 in.
10 in.	1600—2500	1300	1100	900	600	14 in.	2 in.

*Tests made by the Indiana Air Pump Co., Indianapolis, Ind.

Obtain the "percentage of submergence" by dividing the depth the pump is located under the water when the well is being pumped, i.e., working level, by the total vertical distance from the pump to the point of discharge.

Table 1 shows the approximate capacities of pumps with different percentages of submergence, and is calculated from many tests of wells of average depth, and with lifts not exceeding 100 feet.

The increasing use of pumps of this type renders desirable a proper use of the correct terms, and the following explanation may be of assistance to parties desirous of further investigation:

Submergence, B, is the distance from

amount of air are figured in this way and necessarily refer to the actual amount of air taken in through the inlet valves of air compressor, which is generally about 80 to 85 per cent. of displacement.

THAT'S TRUE

What manner of man is he whom very few people care to see, but who is repeatedly asked to call again, with the fervent hope that he forget the invitation? The collector.

Price Cutting and Bad Business

Stock is Capital—Don't Sacrifice it at a Cost to Business Credit. Using Stock on Hand in a Price-Cutting Manner Injures the Price-Cutter as Well as His Competitor—Business of Any Kind Must be Conducted in a Manner Profitable to All Engaged in a Like Business.

IN almost every line of business the temptation arises from time to time to resort to price-cutting in one or more of its various forms.

The grocer, the dry goods merchant, the boot and shoe dealer, and even the butcher, are unable to resist the allurement of week-end sales, special bargains, or some form of special-inducement selling, which in many cases is really nothing more than disguised price-cutting.

The sanitary and heating engineer can by no means lay claim to having resisted the temptation to follow a similar course, and his falling from grace in this respect during the past few years is, in no small measure, responsible for the set-back which the trade has experienced since the abatement in the fever for land and building speculation.

The present war undoubtedly has not tended to improve matters in the sanitary, heating and allied trades: but those who attribute the present depression solely and entirely to the war have failed to look beneath the surface and to read the signs portending the slackening of business, which were already plainly apparent before they were accentuated by the outbreak of the European conflagration.

It is now somewhere about four years ago since most of the large towns and cities of Canada, and more particularly those of the West, were in the toils of the real estate shark and speculative builder. These men cared not for anyone's welfare but their own. Their ill-gotten gains were used in boosting land up to prices far beyond its real value and innumerable mortgages were issued on property on which small sums were accepted as deposits, so that to-day thousands of houses are being rented for sums which would not even pay the interest on the mortgages, to say nothing of the taxes.

Buildings were erected with an utter disregard as to their stability or durability, and in many cases it must be admitted that tradesmen and merchants in general, including the sanitary engineer, played into the hands of the speculative builder, and were the means, perhaps unwittingly, of assisting him in his nefarious and heartless schemes.

Contracts were accepted at prices too low to admit of a fair profit, and this resulted in the installation of inferior material and of low-grade lines of goods. The attitude of the speculative builder was one of supreme indifference. So long as he could by hook or by crook extort from the luckless buyer a deposit sufficient to cover himself and a mortgage upon which he could realize the balance of the purchase money he was in a position to again indulge in his speculative machinations.

It will thus be seen that the price-cutter has, in no small degree, assisted in the continued inflation of the building bubble, until being surcharged with speculative gas, it has finally burst, and a great depreciation in the value of property has taken place owing largely to the worthlessness of the low-grade materials used in the construction of the speculative buildings in question. Inferior material will not stand the wear and tear of high-grade goods, and the natural result of the substitution of the one for the other has been a depreciation in value and consequent general depression which is little short of a calamity.

Before conditions can be permanently ameliorated, there are two matters in which the sanitary engineer must watch closely his course of action. First and foremost, price-cutting and the selling of labor at a sacrifice must cease. Sanitary and heating engineers should place a fixed value both on goods and on labor. Selling goods, which you may happen to have in stock, at less than invoice price and with no added charge for overhead expenses, is not fair to your fellow-competitor. It causes ill-feeling between you and cannot fail to react to your own detriment. Such a course aids the speculative builder in preying upon the craft, with the results above described; it tends to create chaos in the sanitary and heating business and to bring the whole craft into disrepute with the public generally.

The second point which, if permanent and stable conditions are to be attained in the business, must receive the careful attention of the sanitary engineer is the question of instituting an examination, the passing of which should be required of everyone engaging in the business. If it were necessary also to furnish a bond to the local health authorities as a guarantee for good work and the installation of reliable material, such a regulation would automatically do away with the poor work and inferior material for which the speculative builder is responsible.

The more practical a man is these days, the better line of goods will he handle, and without doubt there is far less price-cutting upon contracts for high-class buildings than otherwise.

A man desiring to build a home for himself and family will be far more apt to pay greater attention to the quality of goods which go into his home than the speculative builder will. Such being the case, sanitary and heating engineers who attach greater importance to quality than price will materially assist in killing the speculative building business by refusing to install inferior goods.

How many 5-year guaranteed w.c. combination are there installed in speculative buildings?

How much guaranteed brass work is included in their make-up? and how much pride can be taken in the sanitary and heating equipment of a cut-price job? **None**, not a particle.

And this brings us to another phase of the sanitary and heating business. Just a short time ago a sanitary and heating engineer was asked how he was able to execute a certain job for a given price. His reply was: "Well, you see, I had nearly all the material in stock and wanted the money to pay some of my accounts."

When asked if it would not have been better to liquidate the debts by returning the goods, the reply was: "Oh, yes, but if I went to those fellows (meaning the creditors) for galvanized pipe, I'd have to pay 2 or 3 cents a foot more; and range boilers I bought at $3.75, I'd have to pay $5 for now; but if I returned them, they'd only allow me the invoice price charged me at the time I bought the goods."

Surely this was a short-sighted way of doing business. Yet it is a case which actually occurred. This reminds one of a story of a printer who made light of a cost system. This printer supplied a customer with a quantity of billheads. The price charged for the job was so absurdly inadequate that a fellow-printer in another city who learned of the incident was emboldened to ask questions. "Why," he said, "your price wouldn't pay for the stock, let alone the printing of it." "Well," replied the printer, "since you think you know so much, let me tell you some-

thing. The stock cost me nothing—it was dead stock which I had had on hand for two years. Neither did the composition cost me anything, for my daughter did it. So you see you are not so gol-darned smart after all."

The business man who does a job for less than cost—cost meaning fair present market prices—for goods on hand, plus his own salary and overhead expenses, or who cuts prices because he has a big stock of material, whether that material is paid for or not, is just as foolish as the man who offers to do a job for nothing, because he has already more money in the bank than he would get for the job.

Such practices when viewed in a proper light are dishonest, and should be classed as such.

Ninety per cent. of the men who resort to cutting prices are those who are in business one day, settling up at a few cents on the dollar, and starting over again the next day. The sooner the law of the land discourages such men, the better for all concerned.

You will perhaps better appreciate the injury inflicted upon the honest tradesmen by men of this class if you ask yourself the following question: "How much less could I do work for if I were sure of receiving prompt cash for all work done and material furnished?" or, "How much could I cut down on my overhead expenses if I did not have to provide for bad debts?"

The men who have been in the sanitary and heating trade for twenty years or so, and have made money, are neither price-cutters nor chargers of exorbitant prices. They have built up a good reputation for fair dealing. They have made money by legitimate means, and are to-day enjoying the confidence of their customers.

This is the only way to succeed in business. This is the only way to build up the business edifice of this fair Dominion in a stable and lasting manner: not by booming and creating artificial land or property values, and not by price-cutting, thus assisting the speculative builder, but by seeing that your charges are fair to yourself without being exorbitant, by giving the very best value in goods and in service you possibly can for the money, by making your clients' interests your own, and by working hand-in-hand with fellow-members of the craft.

ACTIVATED SEWAGE DISPOSAL EXPERIMENTS

(Continued from page 23.)

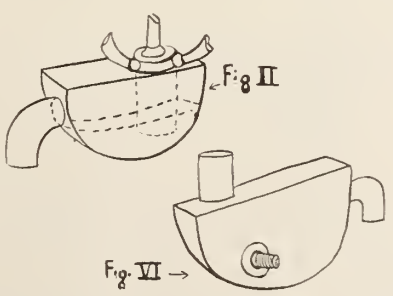
Disposal, and no doubt these methods will receive special attention for some time to come, particularly where large cities and towns are not satisfied with their present methods of sewage disposal. It might be a good plan for such cities as Toronto, Montreal, and Ottawa to thoroughly look into this new method of sewage treatment before spending millions of dollars upon old antiquated methods, or even continuing to pollute our rivers, lakes and navigable streams, as is the case to-day in various parts of Canada.

Experimental Aetivated Sewage Disposal Plant Installed at Regina by R. O. Wynne-Roberts.

A CHAT ABOUT CLEAN-OUTS

(Continued from page 15.)

down into the trap every few days, the cap and screw did not aglutinate, and the sheepskin gasket being frequently renewed, everything, for a time, went merrily as a wedding bell. But the cap and screw were only of light construction, and the too-frequent application of the plumber's pliers put them on the blink. So a strong brass ring with a thread inside was soldered onto the side of the trap, and a heavy brass plug threaded to match the ring was fitted thereto, and this, with slight variation, has constituted the plumber's cleanout ever since.



This is the first time that this veracious history of the institution of the plumber's cleanout has been related, and we certainly have progressed some since then; but that is a matter for another chapter, and if our Editor and my readers will bear with me, I will switch my chat on to those cleanouts most recently and now in vogue, in the next issue.

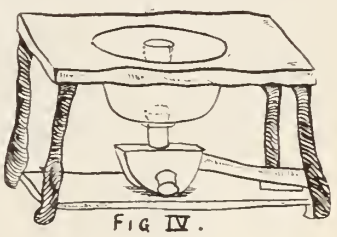


Fig IV.

(Continued in next issue)

NEW PROCESS FOR MAKING LEAD JOINTS

(Continued from page 25.)

surfaces to run together at a lower melting point than that of the body of the lead. This running together has an autogenous effect, and the minute particles of amalgaline are dissipated into the body of the lead, which, by reason of the absorption, becomes stronger at the junction than elsewhere.—Engineering Digest.

It is easy enough to figure out either failure or fortune on paper, but it is a different thing when you come to making these things in real life.

Good recommendations may help a man get a job, but they are not worth much to him after he gets it, for he is then judged by what he does.

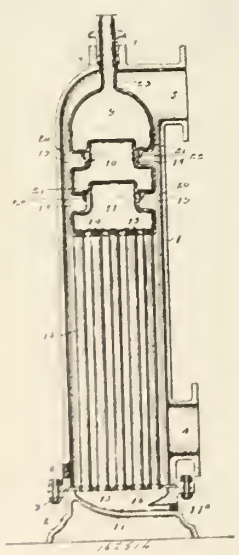
New Canadian Patents

No. 162,514—Heater

Joseph Onesime Guimont, Montreal, Quebec, Canada, 11th May, 1915; 6 years. Filed 6th March, 1915. Receipt No. 248,798.

Claim.—1. In a heater, in combination with a casing, water inlets at one end and water outlets at the other end, a hollow core within said casing comprising a series of communicating domes and straight tubes between the base plate and the bottom of the lower dome, and means for supplying steam at the upper end of said core, and means for conducting condensation water at the bottom end of said core.

2. In a heater, in combination with a substantially vertical casing having a water inlet at its lower end and a water outlet at its upper end, and a gland in its upper end, a base supporting said casing, and having a water outlet therethrough, a series of domes having passaged neck portions by which they are connected one to the other, the lower one of said domes having a perfectly flat bottom having perforations therein, a base plate secured between casing and base, straight tubes connecting said base plate and bottom dome, a condensation outlet, the upper one of said domes having a tubular upward extension passing through a gland, and means for supplying



steam to said domes through said extension.

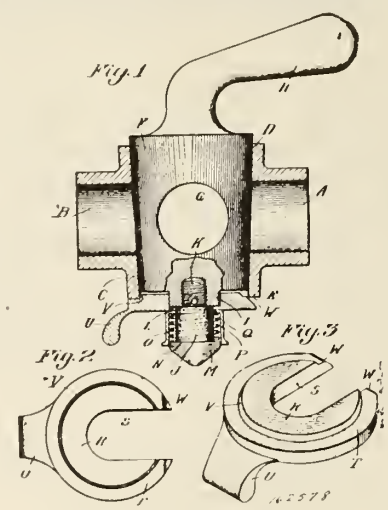
No. 162,578. Plug for Water Taps.

The National Brass Manufacturing Company, assignee of Charles F. Wray, both of Rochester, New York, U. S. A., 18th May, 1915; 6 years. Filed 25th February, 1915. Receipt No. 248,452.

Claim.—1. The combination with a valve body, of a rotary plug arranged in the valve body, and a removable locking member co-operating with the valve body and having a slotted portion engaging the plug, and acting to hold the plug in operative relation to the valve body.

2. The combination with a valve body, of a rotary plug, a locking member removably disposed between the valve body and one end of the plug, and having a slotted portion engaging the plug, and yieldable means on the plug engaging the locking member.

3. The combination with a valve body, of a rotary plug, a locking plate movably



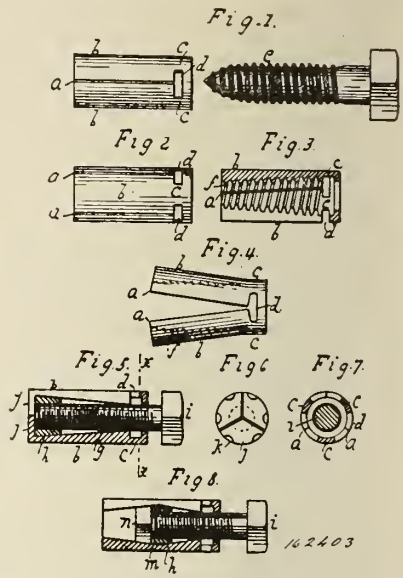
disposed between the valve body and one end of the plug, and having a slot extending from its edge for engagement with the plug, a collar movably mounted on the plug, and engaging sand locking plate, and a spring surrounding the plug and actuating sand collar.

No. 162,403—Bolt Anchor

Albert Law, Brooklyn, New York, U.S.A., 4th May, 1915; 6 years. Filed 30th December, 1914. Receipt No. 246,508.

Claim.—1. A bolt anchor comprising an interiorly threaded metallic sleeve for the insertion of a lag screw, and provided with a series of shanks, each shank having a contracted flexible segment of smaller circumference united to the shank of the shell, said contracted segments forming rectangular slots in a circumferential line with the segments.

2. A bolt anchor comprising an interiorly threaded tapered metallic sleeve for the insertion of a lag screw, and provided with a series of shanks, each shank



having a contracted flexible segment of smaller circumference integral with the neck of the shell, said contracted segments forming rectangular slots in a circumferential line with the segments.

3. A bolt anchor comprising an interiorly tapered metallic sleeve provided with toe portions, said sleeve consisting of a series of shanks having segmental members integrally united to the neck of the shell, said segmental members being of substantially one half the circumference of the shank.

4. A bolt anchor comprising an interiorly double tapered soft metal sleeve provided with a series of shanks having segmental parallel members united to the neck of the shell, said segments being about one-half of the circumference of the shank.

BE DIPLOMATIC WHEN COLLECTING ACCOUNTS

Human nature varies to such an extent that tact and diplomacy are necessary in the collection of accounts. One man is highly indignant when you ask him to pay an account that is five months old, for goods that were bought on thirty days time, while another apologizes when he pays a bill that is thirty days old because it was not paid before. There's no doubt, however, that the first class is in the majority.

Subscribers Are Urged to Send in Questions to be Answreed, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

ONLY SYPHONED ONCE

Editor The Sanitary Engineer,—Can you kindly help me in the following matter:

I have installed two or three septic tanks, constructed as per plan enclosed, but they have proved very unsatisfactory In one case the tank has been installed for over a year, during which time it has only syphoned once.

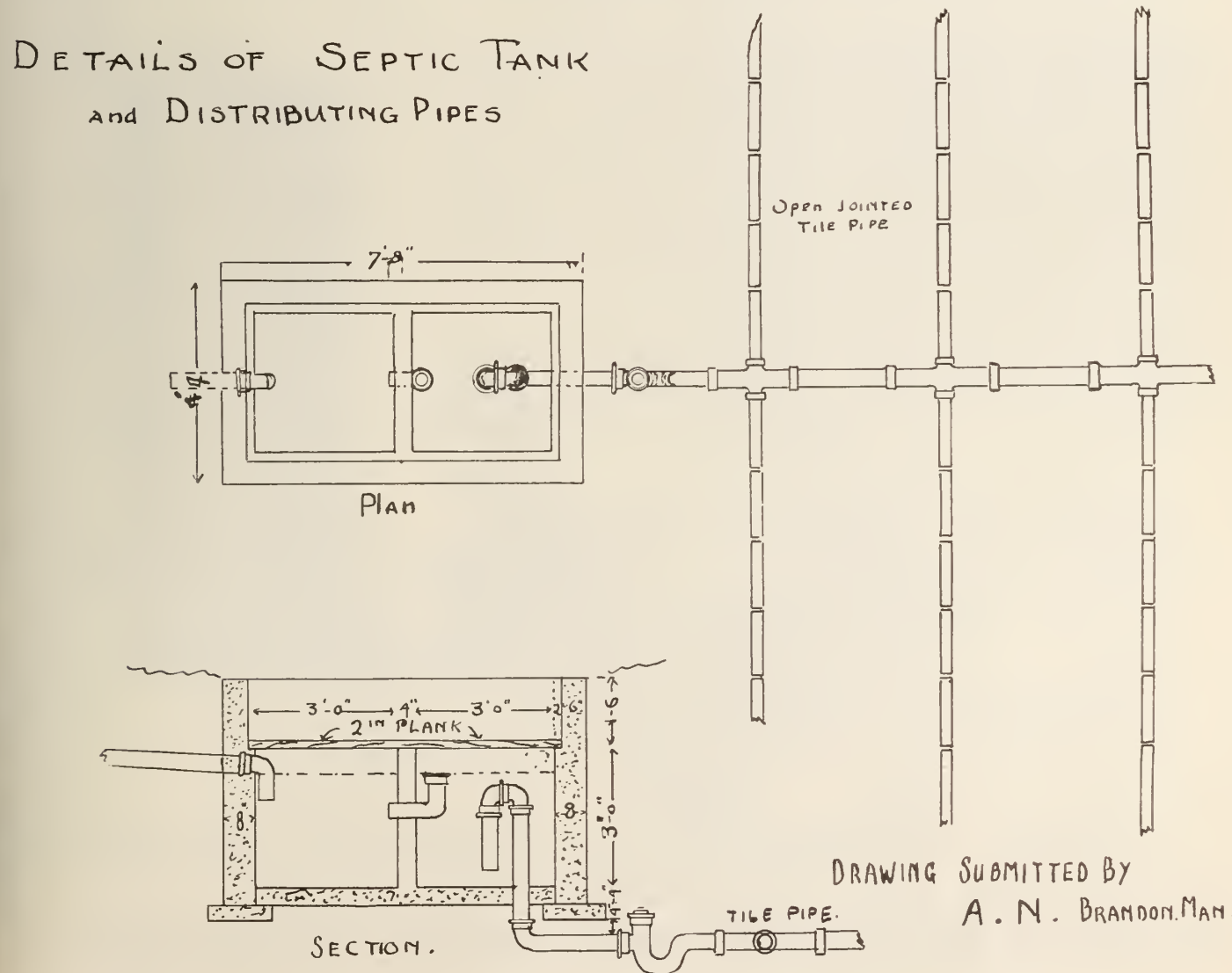
I have also tried dumping a barrel of water into the second chamber, but it was impossible to get the tank to syphon.

Trusting you will be able to give me some reason why this style of septic tank does not work satisfactorily.

A. N. Brandon, Man.

The drawing submitted by A. N. is reproduced below. The reason the syphons do not syphon is because they are not syphons. There is a certain natural law which governs syphonic action, and unless the syphon is constructed in accordance with such law it cannot be termed a syphon.

There must be some medium set up such as will either compress a body of air to such an extent as to set up syphonic action, or create a suction or



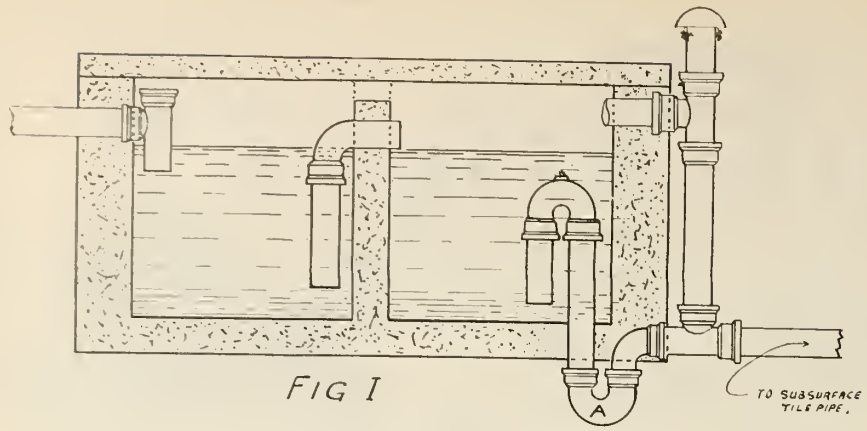


FIG 1

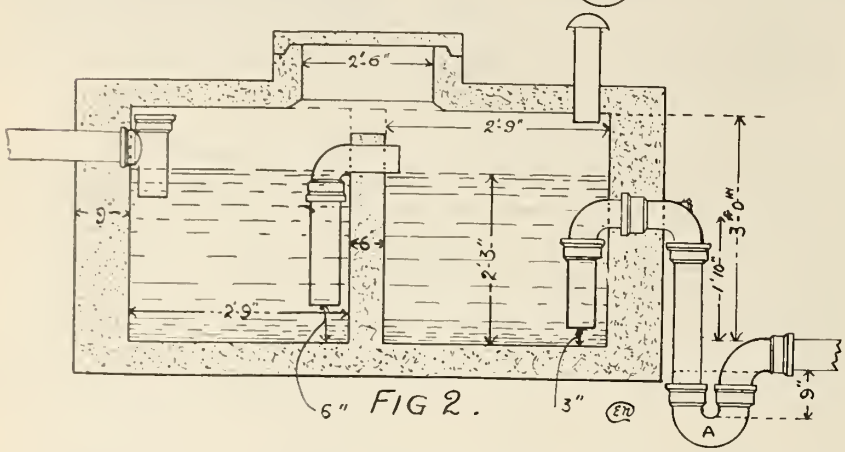


FIG 2.

vacuum which in turn will act upon fluid so as to automatically discharge or elevate it from a lower level to a higher.

Now, the subject under consideration is that of a syphon to automatically and at regular periods discharge the contents of the dosing chamber of a septic tank.

In the design of the septic tank we find one or two points in which a slight change should be made, but with this we will deal later, because they have no bearing upon the failure of the so-called syphons to work.

In Figs. 1 and 2 we show two septic tanks fitted with syphons which will work quite satisfactorily.

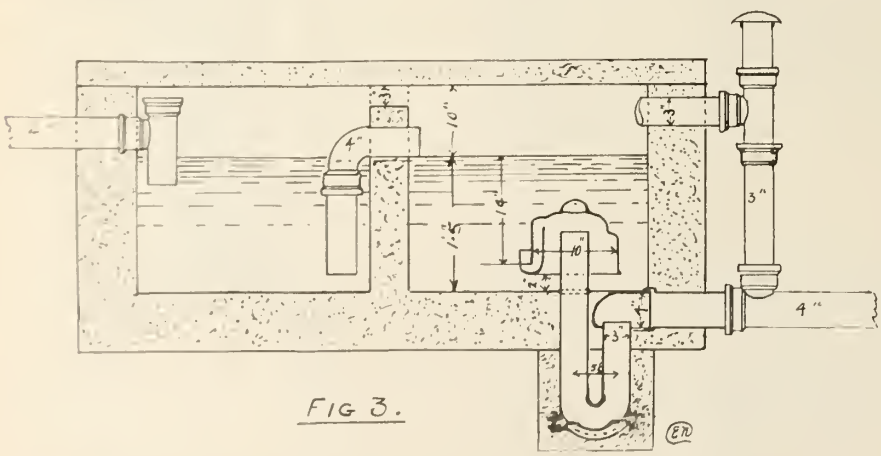


FIG 3.

are made up by using cast iron pipe and fittings as shown. In Fig. 2 it will be seen that actual measurements are given, and if these sizes and measurements are used, any size tank can be made to operate providing the heights are the same.

For instance, the depth of fluid to be flushed is 24 inches, because it will be seen that the seal of the syphon would be broken by the time the contents are lowered to within three inches of the bottom. This being the distance between the bottom of the syphon inlet and bottom of tank.

Now, the first thing to do when starting up such a syphon, is to prime it by filling the lower return bend marked A, through the plug shown at the top of long leg of syphon. Many a syphon has failed to work properly because of its not having been first primed.

The reason for priming is that a certain amount of water is being held in the return bend A, and this water checks the air which becomes compressed between it and the water, or rather fluid, and as soon as the head of fluid in the tank is reached to sufficiently compress the air, which in turn raises the fluid in the leg on the discharge side, the air tries to escape, and in so doing sets up syphonic action.

Many of our readers have insisted that they have made a syphon which worked by simply using an ordinary P trap and some time ago we published plan of a tank showing one which was claimed to have worked; but from practical experience and observation, as well as from a knowledge of the natural laws of physics, we doubt the accuracy of such a statement.

The seal as shown at A in Figs. 1 and 2 must be correspondingly deep enough to retain sufficient air to be compressed by the rising fluid before syphonic action can be set up.

Some of those who have made these claims, reply that "they have never received any complaints." That may be true, but cesspools have been in existence for fifty years and have apparently caused no trouble. But the danger is underground, lurking and waiting for someone to dig or bore a well, when polluted water will be found. Or it may be that the discharge from some of these so-called syphons is finding its way to some lake, pool or running stream. The fact of no complaint having been made is no proof that a septic tank fitted with a P trap syphon is doing proper work.

Fig. 3 shows a septic tank fitted with what is known as the MAC syphon manufactured by the West Toronto Foundry Co., corner of Mulock and Junction avenues, West Toronto.

One of the chief features of this syphon is that a very shallow tank can be built and used with it on account of its low structure.

Such syphons as this have been properly and scientifically constructed, whereas in the case of a built pipe syphon there being no uniformity in size of return bends, traps or ¼ bends, it is next to an impossibility to accurately guage the proper proportions. The time expended, too, on the built pipe syphon costs too much, especially when we understand these MAC syphons are now being marketed at a very low price in comparison to the price charged some time ago.

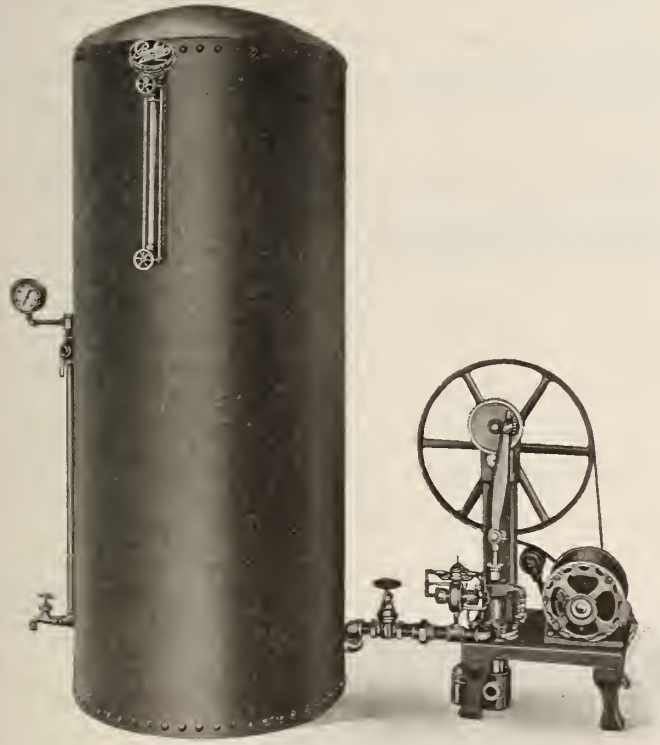
Referring to septic tank design submitted by our enquirer A. N., the syphon of which is simply constructed of soil pipe fittings, it will be seen that the head of fluid would only compress the air sufficiently to cause the fluid in the

(Continued on page 34.)

The Number 500
Peerless House Pump
Is A Real Development

Read the Specification

This pump is the result of thirty years' practical experience and is, we believe, the highest development yet attained in the building of High-Class Domestic Pumping Equipment—there is nothing else like it in the world. We are proud of it.



500 Series Peerless Water System

SPECIFICATION

CAPACITY
250 gallons per hour where the source of supply is not more than 25 ft. below the pump, and 125 gallons per hour where the source of supply is from 25 ft. to 75 ft. below the pump (in the latter case the pump would be set immediately over the well and the cylinder placed within suction distance of the water.)

MOTOR
The Motor is ¼ H.P. Century self-starting machine—positively the highest quality of apparatus for pump work.

OPERATION
The pump is double-acting, though only two valves are used, through the medium of a differential plunger, operating in heavy, solid brass cylinder, with inside surface mirror-finished.

VALVES
The Valves are solid, rubber disc type, on brass seats under quick-seating springs, and are instantly removable.

BEARINGS
The main bearings are of the highest quality of bronze it is possible to procure. They are actually 4% higher in copper than the bronze bearings used by the British Admiralty. Each bearing is made to micrometer measurements so that if renewal ever becomes necessary, it may be accomplished in a few minutes. The lower main bearing is adjustable vertically, so that wear on the gears, even to the extent of 1-1,000th of an inch may be taken up in a moment.

PISTON ROD AND GLAND
These are made of phosphor-bronze, presenting a maximum of resistance to side wear. The packing gland is outside screwed and instantly adjustable by hand.

DRIP PAN
A drip pan cast in the cylinder head surrounds the packing gland so that any escape of water or oil is caught at that point.

LUBRICATION
The head of the pump encloses an oil well capable of holding about one pint machine oil, which is carried over all of the main bearings in a steady stream. The oil passing out through the bearings is caught in a small receiver and returned to the oil well—such an oiling apparatus is practically fool-proof.

AIR COMPRESSOR
Inside the water cylinder is located a positive displacement air compressor which cannot leak water to the floor. A mere turn of the pet cock puts the air compressor into or out of commission at will.

VACUUM CHAMBER
The vacuum chamber is located at the base of the cylinder which insures a continuous flow of matter, without pounding. It is fitted at both back and front with a 1" suction opening to suit any piping arrangement, and also includes the inlet valve, the cover of which is instantly accessible.

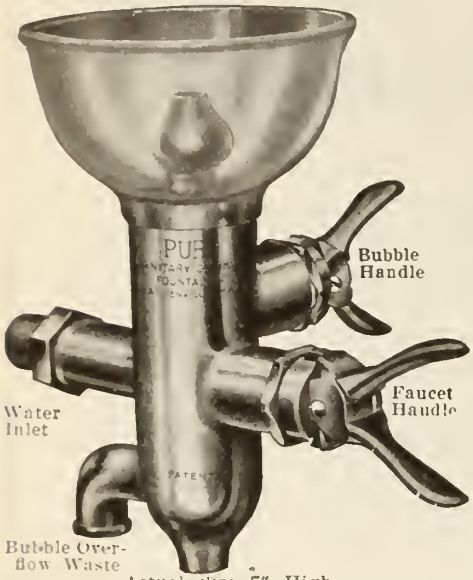
AUTOMATIC SWITCH
The pump is fitted when required with our automatic switch No. 1 for pressure tank work (as illustrated) or No. 2 for open tank work.

TANK EQUIPMENT
For Pneumatic service, the 500 series equipment is shipped complete, as illustrated, in tank capacities ranging from 140 gallons to 315 gallons (or larger if required.)

National Equipment Company, Limited
TORONTO, ONTARIO

PURO
(MADE IN CANADA)

Don't Pay Good Money for Impractical, Unmechanical and Often Worthless Fountains



Actual Size 7" High.

Here is a practical Fountain, which combines the Faucet and Bubble Features—takes care of the overflow waste, and insures

Safety and Service

This is an age of sanitary plumbing and the Sanitary Drinking Fountain is one of its important subdivisions.

SAFETY FIRST **PURO** SERVICE ALWAYS

Is made of heavy brass with extra heavy nickel plate. Bubbler easily controlled by separate "squeeze" handle. No spurts—no choking—inside regulation prevents "showerbath." Faucet is controlled by another squeeze handle. Faucet gives full water pressure. Has thread for hose if wanted.

Write us the number of your employes and water pressure and we'll present an interesting proposition to you promptly.

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147 University Ave., TORONTO, CAN.

Consulting Sanitary Engineer

Advice and plans on
Water Supply and Sewage Disposal for Residences, Factories, etc.

H. L. SEYMOUR, B. A. Sc., A. M. Can. Soc. C. E.
BOX 95. SANITARY ENGINEER TORONTO

ONLY SYPHONED ONCE

(Continued from page 32.)

trap to dribble away, and this dribbling would tend to make the earth sour-sick.

Then referring to the tank itself. It is very poor practice to fit the bend in the centre division as shown; it should rather be placed as shown in Figs. 1, 2 and 3.

There should also be some method of ventilating the tank. This can easily be arranged by following out the design shown in Figs. 1, 2 and 3. The septic chamber, that is the one into which the house drains, should be furnished with air, and in such a way as to carry off $C.O_2$. (carbonic acid) gases up through the soil pipe to the roof. This gas will assist materially in breaking up any solids which may adhere to the walls of the soil pipe, and thus upon a fixture being next flushed, will wash the broken up solids away into the septic tank.

It should be noted that very few septic tanks are absolutely odorless, until after they have been in operation for some months. This is because the proper quantity of bacteria has not yet been cultivated, but as time goes on the odor will soon cease.

TROUBLE WITH PNEUMATIC TANK

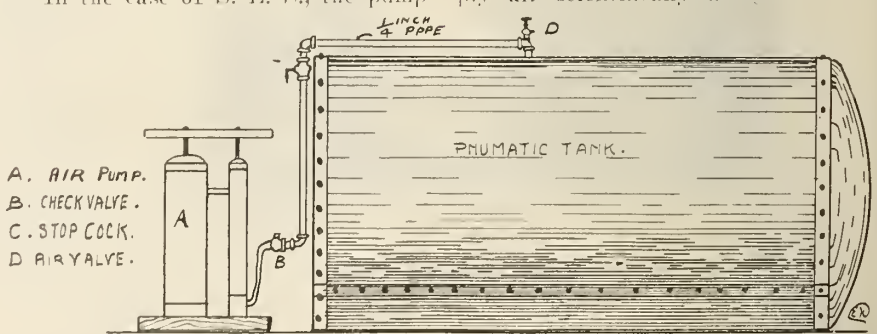
Editor The Sanitary Engineer:

In a country residence where there is a flowing well, I installed a full plumbing system. I found that the water from the well would flow to a sufficient height into the tank by gravity, so I connected a ¼-inch pipe to top of tank and used an air pressure pump something similar to the ones they use for the tanks of the gasoline lighting systems.

I find it takes too long to pump the tank to sufficient pressure (30 pounds). Could you kindly advise me as to cause of the trouble and what would be the best thing to do? I have submitted sketch. S. E. S.

We have reproduced sketch submitted by S. E. S.

In the case of S. E. S., the pump is no doubt too small; but even if a larger pump were furnished, good results could not be gained.



When a tank is, as we often term it, empty, it is just the reverse. It is filled with air. Air is a compressible substance and when water is pumped into a pneumatic tank, the water is forced in and displaces air space as well as compressing the air.

Then again, the water becomes more or less aerated, that is, charged with some of the air which was in the tank before pumping water began. This aerating takes up some of the air, and when water is drawn from the tank some of the air which the water has absorbed escapes with the water.

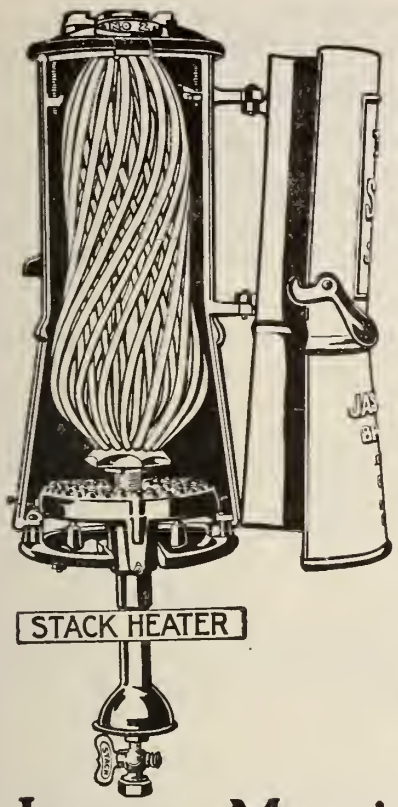
Now, this air must be replaced by pumping more air in, either by a separate air pump or by some provision in connection with the water pumping operation.

To thoroughly demonstrate our assertion, a tank, we will say, is pumped about two-thirds full of water and the pressure stands at 40 lbs. at 6 p.m. at night. Assuming everything to be perfectly tight, there would be a loss in pressure the next morning, that is, of course, providing that no more air had been pumped in with the water.

In the case quoted by S. E. S., we would advise that he install a good hand-pump, providing power cannot at present be installed, and pump the water in in the usual way. Then increase the pressure, say from 25 to 30 lbs., by pumping air in. One thing is sure. Neither all water nor all air pumping will give complete satisfaction.

Here is another reason for this: When the tank has not water in it the valve will be opened to let the water from the spring flow into the tank. The top of the tank must be opened to allow the air out, thus it will be seen that if the tank were to be closed and water forced in, no air would be let out, but rather it is confined and compressed, and a simple agitation of the water will cause a slight loss of air by absorption.

The writer proved this same question 20 years ago by actual experience. No pneumatic water system is complete unless some provision is furnished to supply air scientifically along with the water, or if the system is a large one, say for small towns or large buildings, for fire purposes, then an ordinary force-pump would answer working in conjunction with an air compressor.—Editor.



STACK FACTS

From Recent Tests Made by Various Gas Light Companies

The STACK will heat 5 gallons of water 3 minutes quicker than the average heater.

The STACK raises the temperature of 5 gallons of water 28 degrees higher in 10 minutes than the average heater.

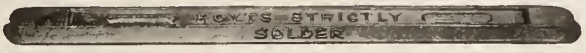
The STACK will heat 3 gallons more in 10 minutes than the average heater.

The STACK shows 15% greater efficiency than the average heater.

James Morrison Brass Mfg. Co., Limited

93-97 Adelaide Street West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

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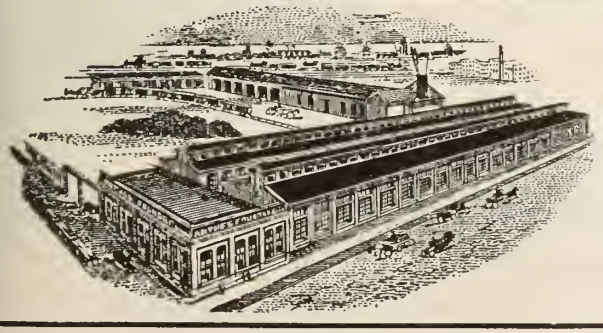
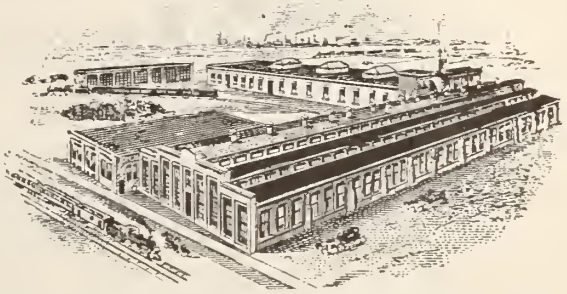


MANUFACTURERS OF

CAST IRON SOIL PIPE AND FITTINGS



ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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IM Brand

Pipe Fittings

Tapped straight to standard size and with full and perfect threads.

Proper weight, even thickness—clean and smooth—carefully made from carefully selected iron.

Made in Canada

Malleable Fittings

With this brand mean fittings made of Air Furnace Refined Iron, reamed and tapped to gauge with perfect threads.

Cast Iron Fittings

With this brand mean fittings made with Iron of high tensile strength—proper proportions and correct tappings.

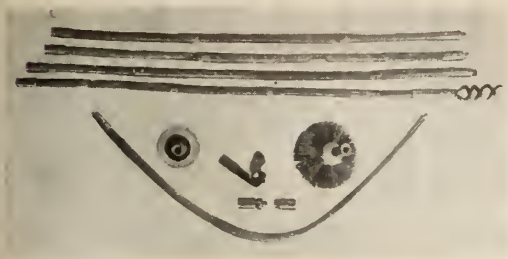
Recessed Drainage Fittings

Standard and Extra Heavy Flanged Fittings and Flanges.

International Malleable Iron Co., Limited

Guelph, Ontario

DRAIN CLEANING MACHINE
As supplied to His Majesty's Government.



Rods made of Malacca Cane, Strong and Pliable, fitted with Jointed Scraper, Screw, Rubber Plunger and Bass Brush.

ROGERS AGENCIES, 84 Victoria St., Toronto

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Consulting Engineer
310 TEMPLE BLDG., BAY STREET
TORONTO
Water Supply, Sewerage, Sewage Disposal, Civic and General Engineering Arbitrations, Investigations, Valuations, Reports, etc.

A WANT AD. IN THIS PAPER WILL BRING REPLIES FROM ALL PARTS OF CANADA.

Condensed Advertisements

FOR SALE

FOR SALE—GOOD LOT METAL WORKING machinery for immediate delivery. All ready to run to help you with those urgent orders. Presses, drills, plain lathes, shears, threaders, tappers, headers, oil forges, automatic shavers and slotters, pulleys, shaftings, etc. Very low prices. Send for catalogue. Shelton Company, Shelton, Conn.

FOR SALE — PLUMBING AND HEATING business in growing Saskatchewan town, about 2,000 population. Sewer and water being laid. Only one other plumbing establishment in the town. Good general stock and tools, also fixtures. Rent very low. This is the opportunity for a smart young fellow who knows his business. Apply Box 96, Sanitary Engineer. (20)

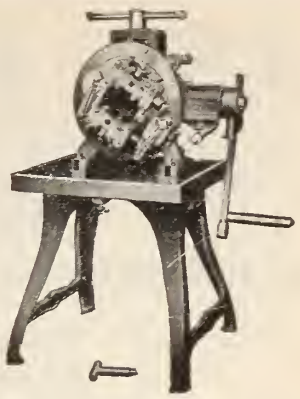
SITUATION WANTED

FOREMAN PLUMBER AND STEAMFITTER seeks position. Practical man; very competent; best references. Apply Box 777, Sanitary Engineer, Montreal. (19)

The Hotstream HEATS IN A HURRY TRADE MARK REG. WATER HEATER

Gas and Gasoline Tank Heaters. Sell on their merits. Every Hotstream Heater installed is a silent salesman. Less expensive in first cost and cheaper to maintain than any other. Best heater for bad water districts ever made. Send for circular and prices.

The Hotstream Heater Co. - Cleveland, Ohio



No. 00

PIPE MACHINES
Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by
THE ARMSTRONG MFG. CO.
317 Knowlton Street
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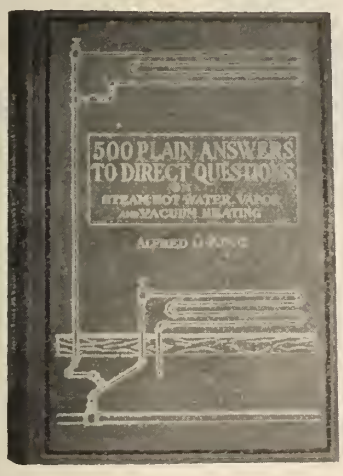
WRITE FOR CATALOGUE

NEW HEATING BOOK

500 Questions and Answers on Steam, Hot Water and Vapor Heating

By A. G. KING



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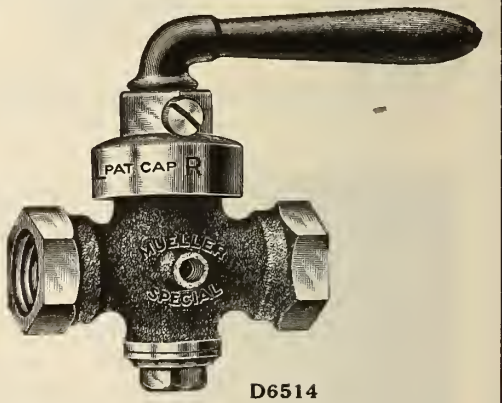

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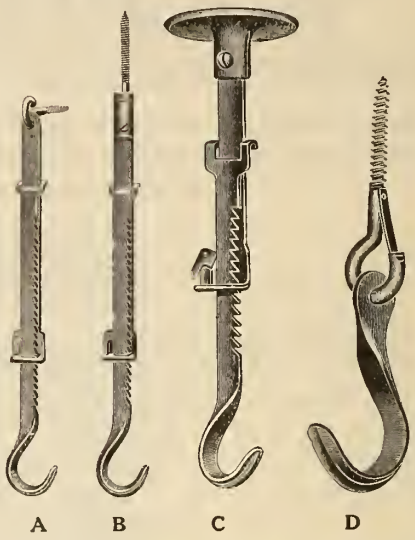

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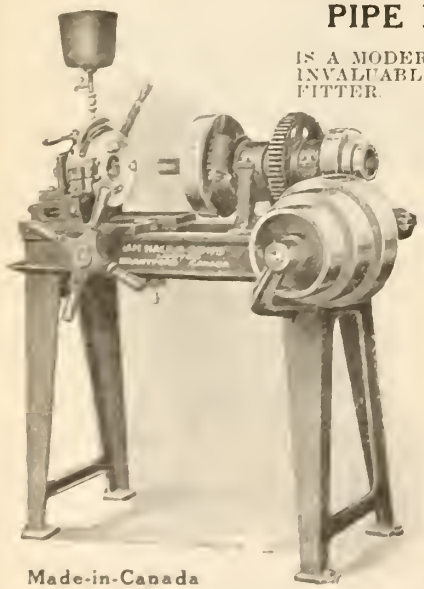

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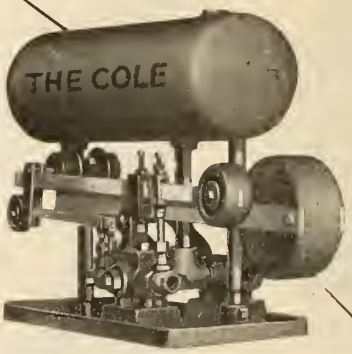

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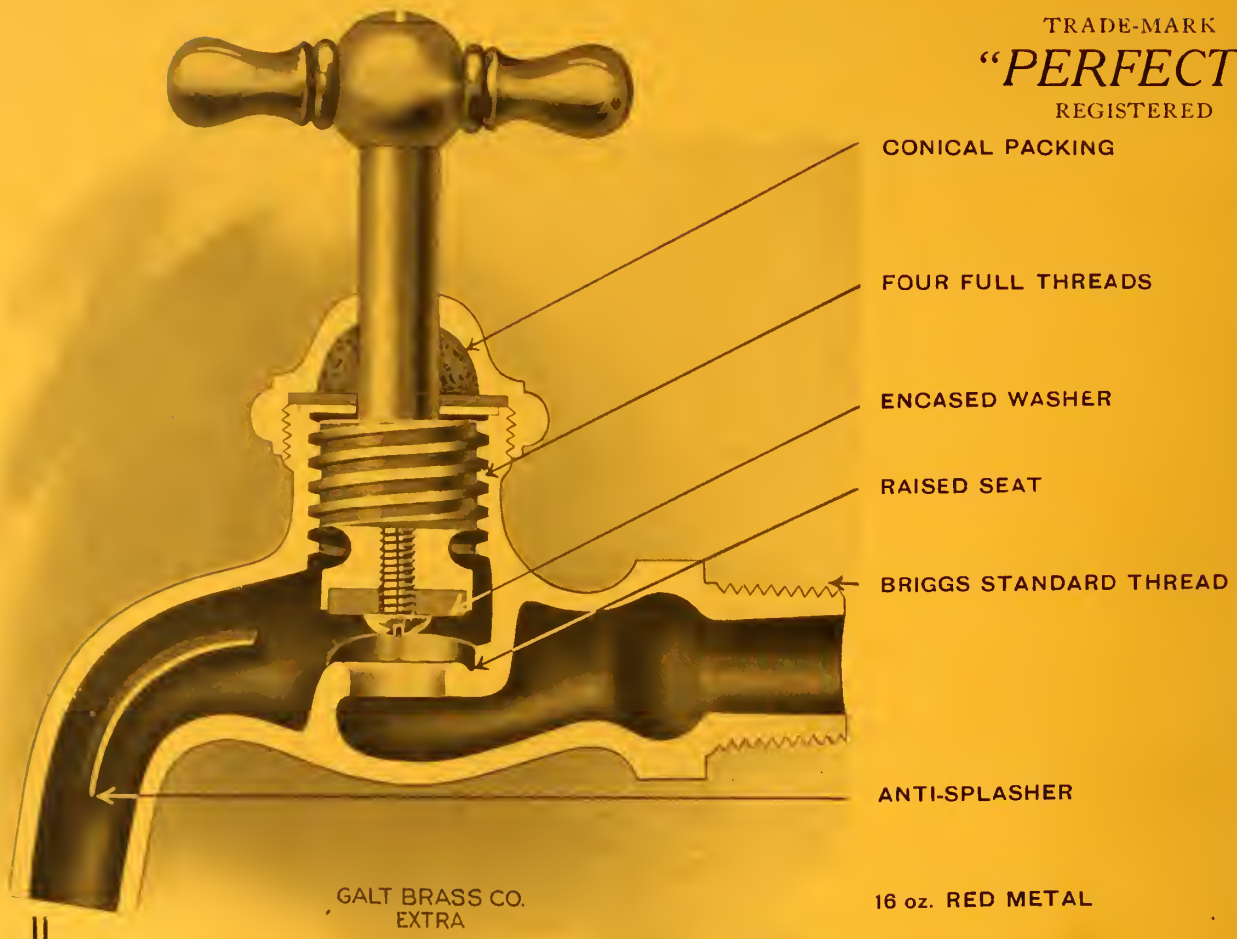

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One man can easily thread a Two-Pipe with this tool.

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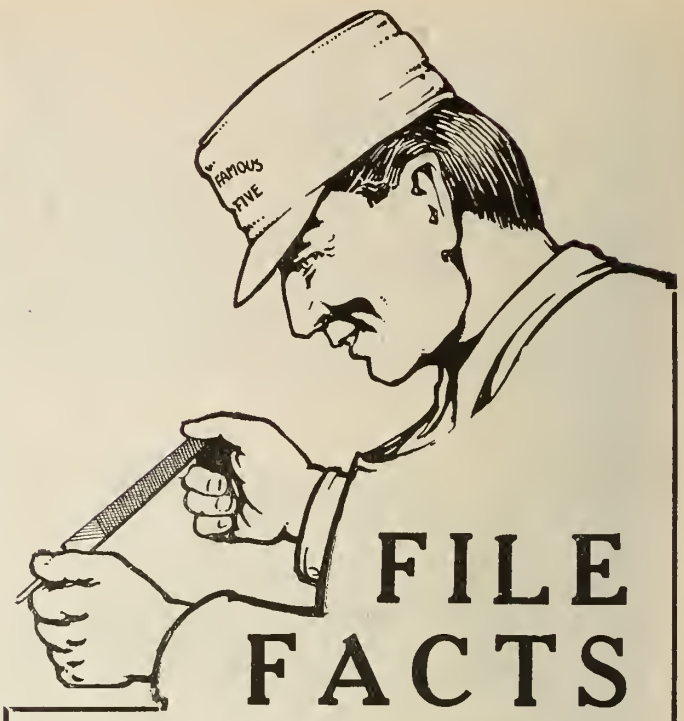

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Teach your workmen that, at a certain point in its life on any work, a file's BEST efficiency is passed. Beyond that point—continued use means **lost time, wasted effort, decreased production and increased cost.**

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give the longest service possible. After years of continuous use, should any part be worn it can be replaced and the valve made as good as when new at a small cost.

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Our Standard Pattern Brass Globe Valves are approved for use in the Provinces by the Departments of Public Works, viz:

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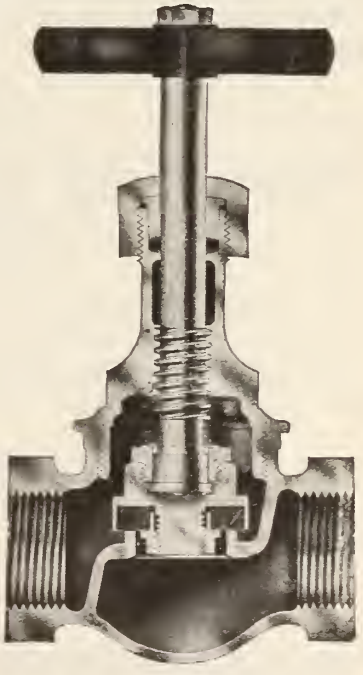

Sectional View
Fig 106
Standard Pattern
Brass Globe Valve
Screwed

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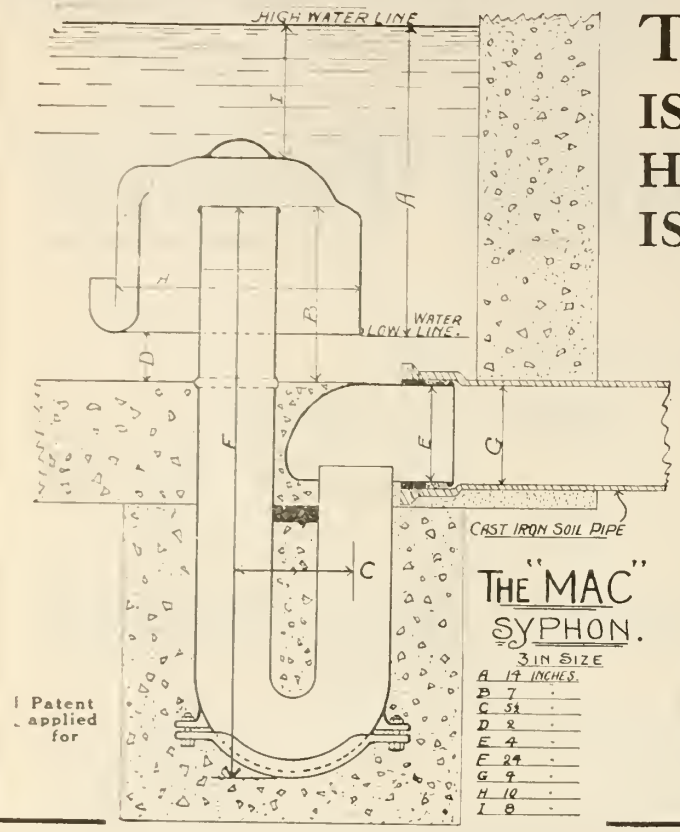

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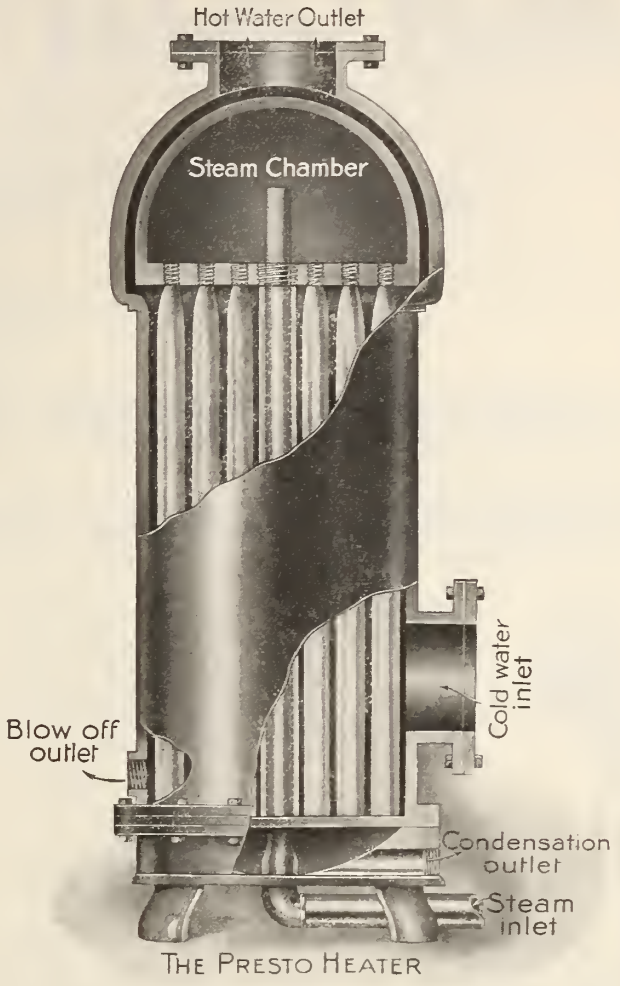

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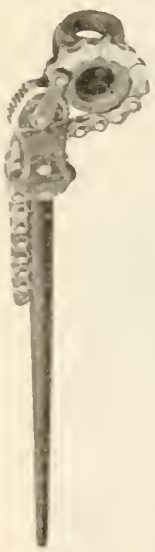

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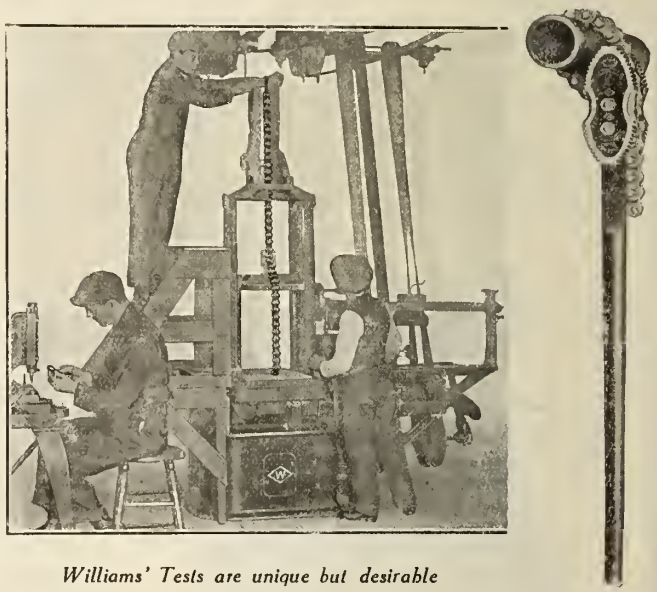

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SANITARY ENGINEER

PLUMBER and STEAMFITTER of CANADA

Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, OCTOBER 15, 1915 No. 20

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EDITORIALS

The Widening of the Field—Pass it Along—What is Honesty

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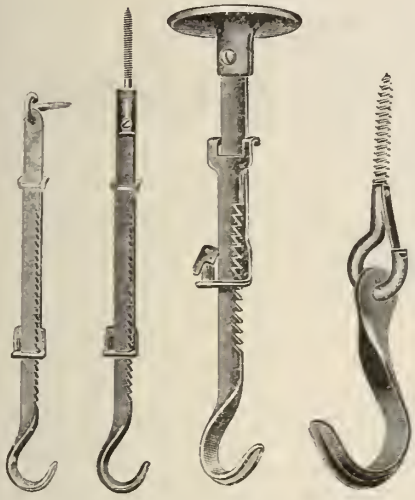

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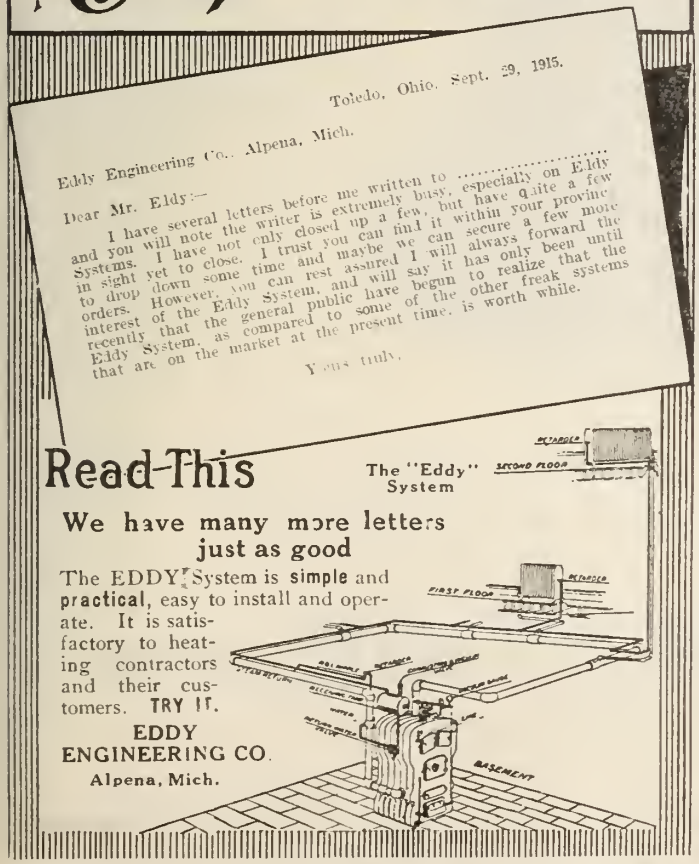

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THE SANITARY ENGINEER

VOL. IX. OCTOBER 15, 1915 No. 20

Analysis of Canadian Plumbing Bylaws

Proposed New Plumbing By-law for Montreal—Many Clauses Not Only Ridiculous, But Impracticable, Proving That Sanitary Engineers Should be Consulted in Such Matters—The Sanitary Engineer Takes Full Responsibility for the Criticism Published in This Series of Articles.

ARTICLE 4

AS a general rule if a by-law or regulation is so worded as to admit of misinterpretation or ambiguity, it is bound to be so misinterpreted. Not always, perhaps, designedly and of malice aforethought, but possibly owing to the "cussedness of things" in general.

It cannot be claimed that the sanitary and heating business provides any striking exception to this general rule and, therefore, when by-laws are compiled, especial care should be exercised in their wording so that in case of doubt the correct line to be followed shall be that of least resistance. For instance, take the three sections, which read as follows:

Detection of Leaks

Section 625.—All sewers, drains, soil, waste, vent and down pipes shall have all openings stopped and be filled with water to prove the absence of leaks in the system.

Testing of Whole System

Section 626.—When a system of plumbing has been tested in sections it shall afterwards be tested as a whole by the water test; the smoke or peppermint tests shall be made by the Department.

System to be Tested Before Use

Section 627.—It is forbidden to use any plumbing system until after a test has been made and found satisfactory by the Department.

The first thing a person will do in the case of Section 625 will be to read it over and find out if he can in any way evade compliance with the section, and what will be the result?

Blind vents, portions of a stack, will be blocked up so that the water does not fill the stack, and a thousand and one tricks will be brought into play to "fool the inspector." In some cases this may work, but not if the inspector is a practical man. This section is, in intention, all that is necessary with one exception and that is, that upon the inspector finding any construction, obstruction or other foreign matter or material, which does not conform with any other section in the making of joints or connections and which would not conform with the letter of the law, the man, be he employer or journeyman, who did the defective work should be subjected to a fine of not less than $5 for each offence.

Many a journeyman who has been known to do work which did not conform with the by-laws has been actually working under instructions from his employer. The writer could cite, on the other hand, many cases where journeymen have resorted to all manner of tricks to cover up their own defective work because of a fear of being discharged or called to account by their employer.

As regards the first test, which generally is the water test, it might have been well to have provided for some alternative test when such tests are being made in winter time, some test which should be just as effective as the water test would be. The Sanitary Engineer would strongly urge that a smoke or peppermint pressure test of not less than 15 pounds per square inch be made. It could very easily be done by the use of a machine with a pressure attachment on the ordinary smoke machine, and in such a case the whole of the work could if necessary be tested at once, instead of in sections. Referring to Section 626, latter paragraph, the smoke test with the bell only should of course be placed upon all work after the fixtures are all installed and placed under actual working conditions, and each fixture operating under its own water seal.

Regarding Section 627, little can be said about it.

Reveals and Recesses

Section 628.—Excepting as provided for in the next section no sewer, drain, soil, waste or vent pipe of any kind sball be built in brick, stone or concrete walls. When necessary to conceal pipes of this class, tben they must be run in suitable reveals or recesses and excepting that in horizontal run where sewer pipe passing behind elevator shafts requires to be offset inwards, the Department may permit it to be so built into the wall as to prevent tbe wall being weakened thereby.

The first portion of this section is all that can be desired, but with the latter we do not agree, that is, where it may allow a pipe to be so "built into the wall as to prevent the wall being weakened thereby," simply because the built-in pipe would form part of the solid wall and would thus be called upon to bear a part of the burden which the solid wall is required to carry. If it is necessary to build recesses in a vertical wall it would also be every bit as consistent to demand that a recess be built in a wall round an elevator or other form of shaft.

Vermin Preventive

Section 629.—Any space left around any sewer, drain, soil, waste, down or vent pipe where such pipe passes through any foundation, wall or partition, shall be satisfactorily filled with the same material as that of which the foundation, wall or partition is made, or it may be covered with suitable metal flashing or collars so as to effectually prevent leaving an avenue for the entrance of vermin into tbe premises.

Section 629 is not as up-to-date and practical as it might be by any means, and goes to prove again that those who

compiled these sections were not as close to the every-day working conditions as men should have been who would take the responsibility of making up a plumbing by-law.

For instance, it is well known that no pipe passing through a foundation wall should be fixed in, as would be the case if Section 629 were enforced.

In Canada, where foundations are seldom if ever actually fixed, but are heaving and settling year in and year out, no pipe should be built into the wall. Where such pipes pass through a foundation wall, an arch should be built or several stones or bricks left out, and the space then filled with sand, so as to allow of the pipe being free, and where a pipe passes through a partition or wall into another compartment, there should be a metal flange fitted on either side to prevent vermin passing through.

Refrigerator Filters

Section 630.—Water filters, ice-boxes or refrigerators shall be connected to or with the sewerage or drainage system only by separate waste branches properly tapped.

Here is another section which is not clear. Of course it might or might not be properly construed, but the letter of the section leads one to believe, first of all, that "water filters, ice-boxes or refrigerators shall be connected to or with the sewerage or drainage system," and that such branches, to which the fixtures mentioned are attached, shall be properly trapped.

The fact of the matter is that no such fixture should under any condition have any connection whatever with the sewerage or drainage system.

But rather should have a separate set of piping which should terminate at an open fixture or trap, but not directly connected to said trap.

Another thing, all such pipes should be so constructed that they could be thoroughly flushed and a screwed cap fitted to each and every outlet, so that in winter or times when these fixtures aforenamed are not in use, these outlets could be effectively closed.

There is not sufficient importance given to all such piping by any means, and nothing can give off as offensive an odor as the waste pipe from a refrigerator, particularly when the ice has become soiled. Moreover, many a time this fixture has been found to be too small, then milk, meat and other foods have been crowded into the ice partition. Milk has been spilt, etc., and thus has set up bad odors in the waste pipes mentioned.

Brick Flue Restrictions

Section 631.—No brick, sheet metal or tile flue shall be used as a sewer or drain ventilator, nor shall any chimney flue be used for this purpose.

This section would have been a little clearer had it been mentioned that it does not refer to local venting. Apart from that it is just as well to have some such clause embodied in all plumbing by-laws.

Extra Heavy Piping

Section 632.—In every building where the drop exceeds thirty-six feet (36′) reckoned from the top of the first floor to the top of the floor on which the highest fixture is located, soil and waste pipe shall be of extra cast iron pipe and the fittings to same shall be extra heavy, or standard galvanized wrought iron pipe and cast iron taw dipped threaded fittings may be used.

The first portion of this section is rather a debatable point, where it demands extra heavy pipe for stacks of over 36 feet.

It is not, in the opinion of The Sanitary Engineer, necessary to arrive at the weight of such pipe in that way.

If extra heavy pipe is necessary it is not because of the height, but rather the location of said pipe, that is when the 4-inch size is being used. It might be advisable to demand extra heavy from another standpoint, that of diameter, because if there were a large number of fixtures on a soil pipe line, either vertical or horizontal, which warranted 5 or 6 inch, then extra heavy would not be out of place. Further in the case of a rain water leader situated in the interior of a building, extra heavy should be demanded for any size 5 inches or over.

Referring to the latter portion of this section, where galvanized pipe is permitted, **"and cast iron tar dipped, threaded fittings may be used,"**

These should not be allowed by any means, no tarred fittings of any kind should be permitted and particularly those that are not to be buried underground. If galvanized pipe is required to be used, then galvanized, cast or malleable recessed drainage fittings should be demanded.

Down Pipes Heavy and Standard

Section 633.—Excepting outside down pipes, all down pipes, exceeding fifty-five feet (55′) perpendicularly, reckoning from the roof's outlet to the point where the down pipe connects with the drain or sewer, shall be of either extra heavy cast iron or of standard galvanized wrought iron pipe, from top to bottom.

It may or may not have been noted by our readers that "Standard" pipe has from time to time been referred to. Now, to our knowledge, there is no such thing as "standard" cast iron soil pipe in Canada. It may be well to mention here that in the opinion of The Sanitary Engineer no other cast-iron soil pipe should be allowed than those two kinds known and universally recognized as medium, and extra heavy. The word standard is really meaningless to the practical man, and to the unpractical man it may mean the very thinnest that can be procured, and when referring to section 633 we think it is one of those sections which could be done without and replaced by one more to the point.

Standard Stacks

Section 634.—Soil pipe stacks continuing above the highest fixture and serving as a vent pipe or three inch (3″) or larger cast-iron serving as a vent, may be of standard cast iron pipe or galvanized wrought iron pipe, but there shall not be intermediate sections of different material or quality.

The above section deserves considerable commenting upon and would never have been compiled by a body of practical men. For instance, there is no reason in the world why the pipe above the highest fixture should not be exactly of the same quality. Kind and weight as that of the pipe below the fixture, and for all the difference in price it matters little. The only purpose such a section could serve would be to allow members of the trade to install light pipe or some kind inferior to the pipe on the lower portion.

Such a practice as using lighter pipe would be very bad, for various reasons, chiefly that if any additional fixtures were required to be installed, all the piping and fittings about the fixture at first installed would require to be changes.

Commenting upon the latter portion of this section, we feel that all soil or vent pipe stacks should be of a uniform kind, and not part cast iron and part galvanized.

(Continued in next issue)

Beach Foundry Co. Stoves, Ranges and Furnace Catalogue

The Beach Foundry Co., Ottawa, Ont., has just issued catalogue No. 20, featuring the company's extensive line of Maple Leaf stoves, ranges and furnaces. The catalogue, consisting of 112 pages, is handsomely gotten up. The illustrations show up splendidly on coated paper. The cover is exceptionally attractive. A pocket has been provided in the inside back cover for holding the price list, which has also been attractively gotten up in book form. In addition to prices on stoves, ranges and furnaces, there are prices on all repair parts. One decidedly interesting feature in connection with the catalogue is a description of "how the Maple Leaf line is made." Six pages have been devoted to illustrate and describe the process of manufacture of the company's products. The illustrations reproduced in colors are very attractive. The description is interesting and educative.

Manufacture of Boilers and Radiators

The Production of Steam and Hot Water Heating Apparatus is a highly Specialized Development in Modern Iron Founding. Systematic Care and Increasing Attention are Necessary for the Continued Production of Satisfactory Work—In the Following Article a Brief Description is Given of a Visit to One of Those Plants

THE No. 3 plant of Steel & Radiation, Ltd., is situated on the outskirts of the town of St. Catharines, Ont., a progressive and flourishing community of over 14,000 inhabitants. The Grand Trunk Railway System supplies convenient transportation facilities and the comparatively close proximity of such manufacturing centres as Toronto, Hamilton, Welland, Niagara Falls, and Buffalo, ensures a favorable market in which to secure labor, materials, etc. The plant, which is comparatively new specializes in apparatus for steam and hot water heating and full advantage has been taken of such methods and equipment as can be adopted where high class repetition work is required.

Buildings

The buildings consist of three principal bays running north and south and connected by a spacious cross aisle. The pattern shop, pattern store, and stock room are separately housed in detached buildings to the north of the main structure. All of the buildings are of modern design, an important constructional feature being the liberal use made of "Fenestra" steel sash, which is manufactured in Canada by this company. The efficiency of this product in providing light and ventilation is widely recognized, and its use, combined with ample height and floor space, provides ideal conditions for foundry operations. With the exception of the moulding department which is paved with brick, the shop has wooden floors throughout and in all respects is thoroughly representative of this particular sphere of modern foundry practice.

Raw material consisting of pig iron, coke, sand, scrap iron, etc., is delivered on the railway siding close to the cupola, a suitable covered storage space enabling a stock of material to be kept on hand

FIG. 1. FINISHED CORE AND CORE OVEN DEPARTMENT.

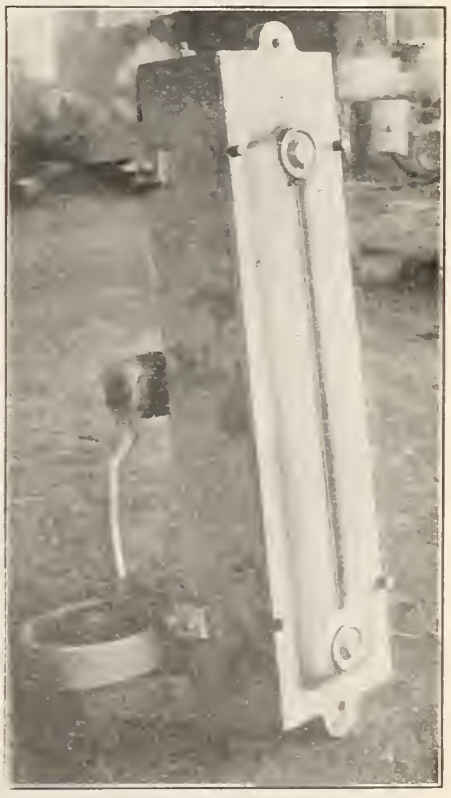

FIG. 2. MOLDING MACHINE FOR RADIATOR SECTIONS.

should weather conditions interfere with its handling in the open.

Cupola Installation

The cupola is installed at the east end of the cross aisle and ample space is provided to allow of safe and rapid handling of the ladles. Close to the cupola is the blower room in which is a large "Connersville" blower of ample capacity, belt driven by a 50-horse power motor. Two belt driven air compressors supply compressed air for hoists, etc. The cupola elevator gear is conveniently situated in this room and is operated by a 15-horse power motor. Electrical energy is obtained from Niagara Falls, the shop equipment including a transformer set which supplies 3-phrase 25-cycle current at a pressure of 550 volts.

Owing to the high grade of work required, metal patterns are used almost exclusively. After the cores are formed of specially prepared sand, they are placed on trucks with suitable bodies and run into the drying ovens. A transfer truck runs on a track across each end of the core ovens thus allowing any rack to be put into any oven, and when dried, to be placed in any desired position, in the storage space, where the cores are arranged on frames for transference to the moulding department.

Modern Methods

As would be expected in a plant of this description, moulding machines are largely used, Fig. 2 showing one type of machine which is simple, strong, accurate, and quick. Fig. 3 shows a view in the moulding shop, it being amply equipped

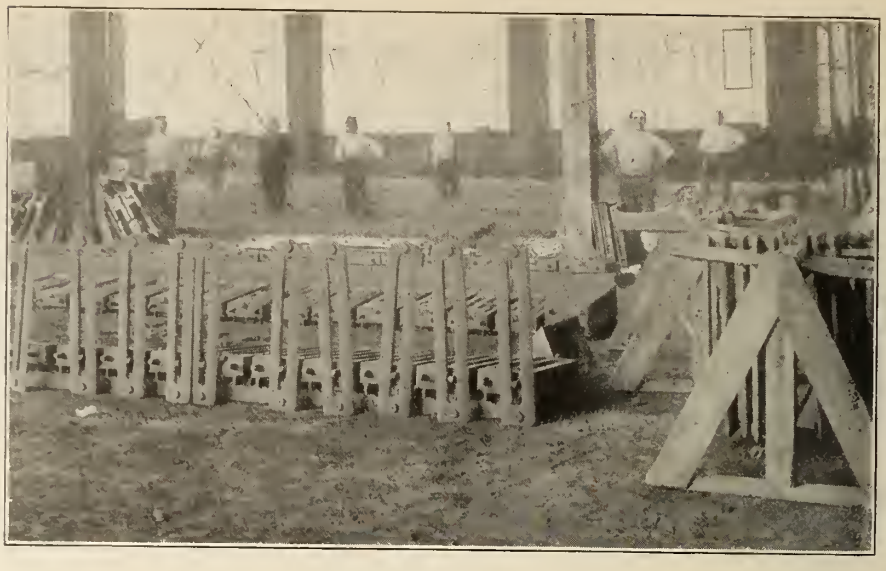

FIG. 3. RADIATOR MOLDING SHOP.

with traveling air hoists, which save considerable time and labor in conveying the ladles of hot metal to the moulds. An overhead electric hoist travels on a track along the cross aisle and is used for transferring work from one bay to another.

A view of boiler moulds in course of preparation is shown in Fig. 4. The number of different pieces required in producing the boilers is greater than with radiators, in addition, the shape of the parts does not allow of the same moulding methods being pursued. As a result of this, the methods in use are similar to those generally adopted in the production of high grade foundry work, skilled labor and the best of materials and equipment being indispensable to the maintenance of the company's standard of excellence. A complete equipment of sand blasting and rumbling machinery is installed, and after being thoroughly cleaned the various parts are tested under hydraulic pressure. Specially designed fixtures enable this operation to be accomplished rapidly and satisfactorily.

Although the actual amount of machine work on radiators is not great, it has to be performed with a considerable degree of accuracy. The faces of the bosses which join each other must all be parallel; there must be exactly the same thickness from face to face, and the two faces on either side must be exactly in line. While slight inaccuracies do not appreciably affect a radiator

FIG. 4. HEATING BOILER MOLDING SHOP.

FIG. 5. GENERAL VIEW OF FETTLING SHOP.

composed of say six or less sections, the cumulative affect of bad machine work on 18 or 20 sections is quite apparent to a casual observer. Special machines which tap and face the four holes of a section simultaneously with the required degree of accuracy have been designed and built in the plant.

As can be observed in photograph, Fig. 5, the machine consists of two carriages, each of which carries two spindles. One of the carriages is rigid while the other is adjustable along the ways in the foreground of the picture. The machine shown has an adjustment of from 20 inches to 45 inches between centres of spindles, sufficient to handle all ordinary radiator sections.

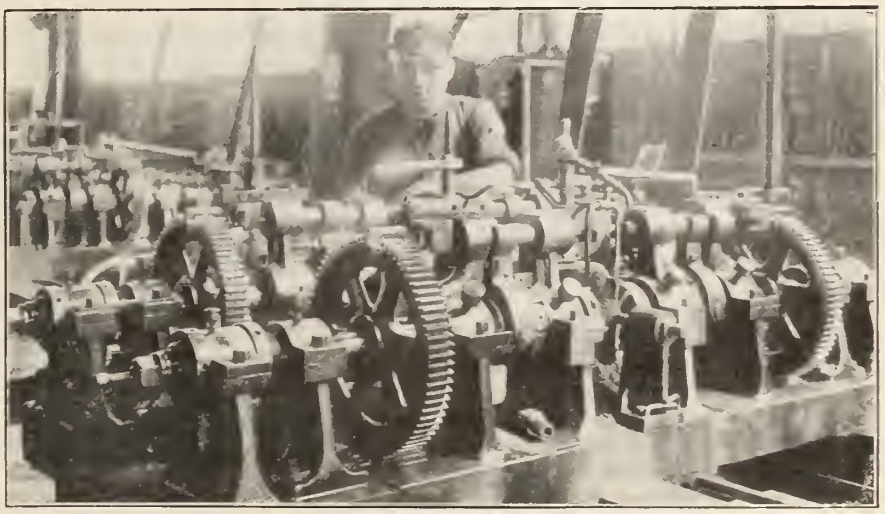

FIG. 6. TAPPING AND FACING MACHINE.

Radiator Assembly

The threaded nipple system of construction is used exclusively in the company's radiators, making it thereby possible to produce tighter joints with less possibility of damage to the castings than when the push nipple joint is used. The latter method involves the use of tie rods or braces, which are unsightly when used externally, and interfere with the circulation when used internally. Furthermore, it is an easy matter to dissemble a threaded nipple for repairs, whereas a push nipple joint can only be separated at considerable risk of damage to sound parts of the radiator. As a result of this method of construction, few, if any, sections fail when the final hydraulic test is applied to the assembled unit.

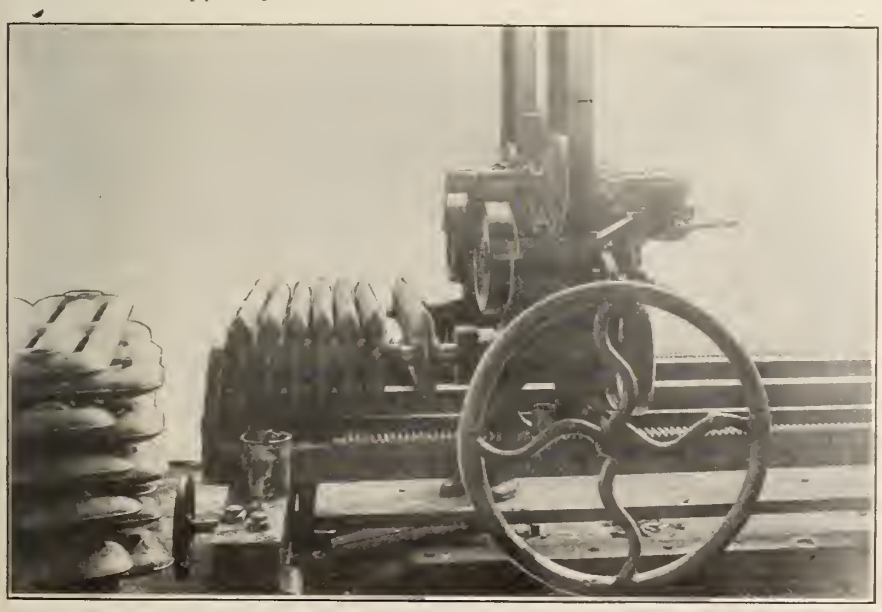

FIG. 7. RADIATOR ASSEMBLING MACHINE.

Conditions render the use of push nipples desirable in the construction of steam and hot water boiler of which

(Continued on page 24.)

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

Article 14

IN the preceding articles some of the fundamental facts and principles relating to various sciences have been briefly treated. Experience teaches the artisan the "how" but he cannot claim to be an engineer until he knows the "why" and can successfully relate the two. The greater the store of knowledge the more correctly can the engineer interpret the results of his experience.

Experience will for example show that a suction pump can raise water that is 15 or 20 feet below the pump cylinder, a more perfectly constructed pump will will raise it 25 feet or even a few feet more. It might be argued from such experience that if a pump were perfectly constructed it might raise water any distance. The scientist knows however, the principle upon which the water is raised and that the weight of the atmosphere will not balance more than 34 feet of water at sea level, no matter how perfect the vacuum created. No doubt the pratical limit of a "suction" pump is common knowledge but the writer knows of one man who has installed water systems and who yet was of the opinion that a pump could not deliver water to any greater height than it could raise it. That is, if a pump could only raise water in its suction pipe from a point 20 feet below it, then it was expected that the water could only be lifted 20 feet above the pump. As already pointed out water can be lifted or forced to any height limited only by the strength of the pump and the force applied.

Another point about which a mistake may be made through lack of knowledge is in determining the size of the suction pipe. The writer has heard it argued that the larger the suction pipe the harder it is for the pump to raise water. When once the air has been pumped out, of the suction pipe which should of course be air-tight and if the water is kept in the suction pipe by a foot or check valve then the larger the pipe the less the friction and consequently the easier to operate the pump. However, large pipe costs more than small and if a very large suction pipe were used the initial cost of the pipe would more than offset by the saving in the cost of the pumping. The practical rule in ordinary cases is therefore to make the suction pipe one-half the diameter of the pump cylinder.

In connection with pumping, the writer has also noted another common mistake. In figuring how high above the source of supply a pump can be placed the distance has been measured from the bottom of the suction pipe instead of from the surface of the water.

For example in the case shown in FIG. 33 the pump cylinder could be placed 25 feet above the surface of the water in the reservoir, pond or lake, because the water would rise of its own accord in the suction pipe to the level of the surrounding water. If one considered however, that the suction lift had to be measured from the bottom of the suction pipe the pump would be placed several feet lower when it might be in some cases an advantage to have it at the highest allowable elevation. It might be noted here however, that ordinarily the nearer the pump is to the source of the supply, the better results it will give.

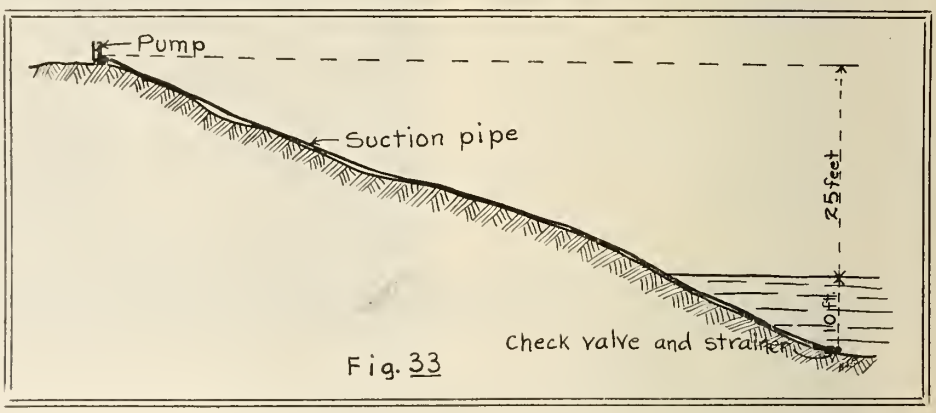

Fig. 33

The preceding examples are only a few of many that might be cited to show how easily mistakes may be made due to the lack of scientific knowledge. If knowledge is essential in the case of pumping, how much more necessary it is in solving problems, more directly related to sanitation. To be effective in the prevention of disease conditions, the engineer must have a knowledge of the "why" of many things, some of which it has been the object of these articles to present in an elementary way. The need of such knowledge will doubtless become apparent as we discuss disease and disease prevention.

Sanitary Inspection of Water Supplies

As stated in the previous article the wells most exposed to contamination are surface or shallow wells. Deep wells are generaly expensive to bore and so for small communities and private dwellings, the shallow well becomes the source of the water supply. Consequently it is very important to adopt every safeguard against pollution of shallow wells. Don and Chisholm in their "Modern Methods of Water Purification" advise the following precautions;

1. The well should be removed as far away as possible from manure-pits, cesspools and other possible sources of contamination, and always towards the direction from which the underground waters flow. It should not be situated in a hollow to which surface water tends, but rather on a site which naturally throws off the rainfall. Nor should it be placed on ground which is liable to be inundated with flood water.

2. A space all round should be fenced in, and kept under grass or planted. Local considerations may limit the radius of this space to a few yards, but it is doubtful whether anything less than 100 feet can be looked upon as a real safeguard in gravity strata. The enclosure should extend more in the direction from which the subsoil percolates

3. The well should be cased watertight to the bottom, or in any case to not less than 20 feet. The casing should be carried 2 or 3 feet above the surface, and the ground surrounding should be laid with cement or otherwise made water-tight to a distance of 4 feet. It is recommended that the pump be separated from the well-head, and placed

some distance away, so as to minimize risks from spilt water finding its way inside. The top of the well should be protected from dust by a suitable covering.

4. Samples of water should be taken for analysis from time to time. In addition the consumer should observe the character of the supply, noting how it changes with weather and season. Wells which become turbid after heavy rainfall are always to be suspected.

It is very difficult to define the safe distance of a well from a cesspool because it depends on many factors. Among these are the character of the soil, the distance of the ground water below the surface and the contains of the surface of the ground. In rocky ground there may be fissures that allow the well water to be polluted from long distances.

When water is pumped from a shallow well the level of the water in the well is lowered and the surface of the ground water becomes similar to that shown in Fig. 34 in which XZ is the original surface of the ground water before pumping. The area within which the level is lowered to any extent is called the circle of influence. Where, as usual, there is a general flow of ground water the circle of influence will broaden out just far enough to include an area into which the flow of water is equal to the pumpage. Some authorities give an average distance of 100 feet for the radius of this circle of influence.

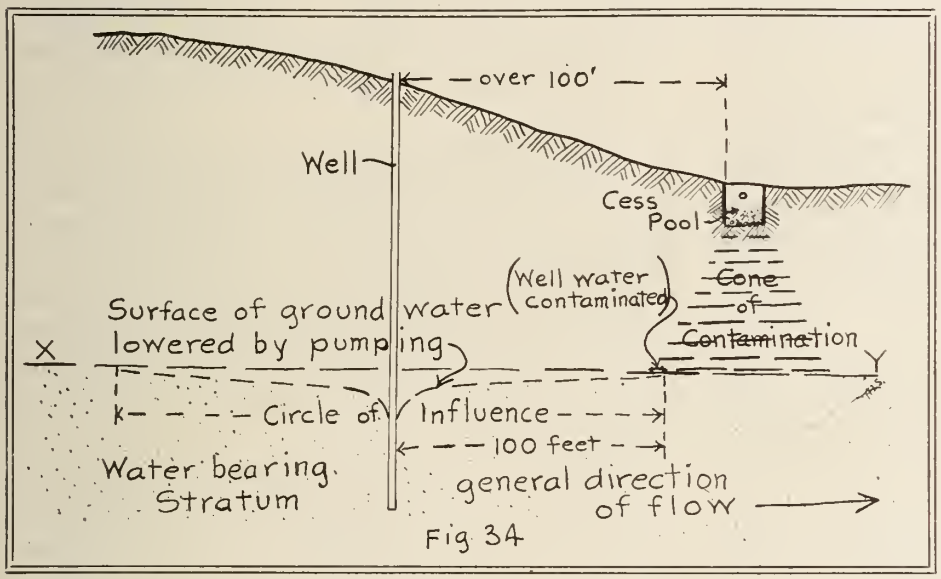

Fig 34

Polluted water from cesspool or other surface pollution does not percolate straight down into the soil but spreads out laterally to a certain extent and the soil contaminated may take the form of a cone as shown in Fig. 34.

In such a case even though the cesspool is located on the side of the well from which the ground water tends to flow and at a distance of over 100 feet away there may yet be danger of contamination from such a source as the illustration shows.

When it is desired to make certain whether any particular cesspool or rubbish heap is contaminating a well, tests, chemical or otherwise, can be made. A strong solution of such a chemical as common salt is poured into the suspected place. The well is then pumped continuously and samples of the water taken from time to time and examined. Now common salt (NaCl) is a compound containing Chlorine. If the analyses show that the amount of Chlorine in the well water has decidedly increased, then it is a proof that liquids can pass from the suspected locality into the well. Strong dyes or substances with a marked taste or odor are also used as tests.

It should be noted that the fact that liquids may pass through the soil, does not necessarily mean that dangerous bacteria will also reach the well. They may be filtered out in the soil or the bacteria may even die in the time necessary for the liquid to reach the well. Sometimes then there may be a doubt after a chemical test and a culture of harmless bacteria are introduced at the suspected locality. If these bacteria reach the well alive the test can be considered final as it is practically certain that any disease bacteria from the same source could also reach the well.

The open dug well with a lining not water tight was more frequently sunk in the past than at present. It is of course very easily polluted because the seepage from the soil can enter the well near the top with little or no filtration through the soil. The better class of wells are now either driven or drilled. In either case the sides of the well are generally lined with iron casing that is impervious to seepage. Contamination is in such cases ordinarily only due to impure ground water into which the wells are sunk.

From the foregoing and bearing in mind the objects of a sanitary inspection it may be gathered what constitute the important points in a sanitary inspection of a well or other source of water supply. They may be given as follows:

1. Make an inspection or survey of the area from which the water supply is collected, noting the important physical features.

2. Sketch the surroundings of the place of collection and give distances and elevations of houses, cesspools, rubbish heaps, barns and fertilised land.

3. Obtain as full and reliable information as possible relating to the geology of the area under inspection and note the character of the soil or outcropping rocks.

4. Note the character of the well or other source of supply and the precautions, if any, taken to keep it free from pollution.

5. It may also be of value to obtain information in regard to the rainfall and other climatic conditions.

In making a sanitary inspection samples of water are generally taken at the same time. The method to be adopted in obtaining such samples will be later discussed under water analysis.

In the First Annual Report of the Commission of Conservation of Canada, Dr. Bryce, Chief Medical Officer, Dept. of Interior, Ottawa, makes the following statement:

"The causes of typhoid outbreak in Sault Ste. Marie in 1906, were given as:

1. The location of the intake pipe of the Steel plant water supply where it could not fail to pump up water from a polluted source.

2. The location of the city water pipe proper in the power canal liable for all the months of navigation to pollution with sewage.

3. Many shallow polluted wells.

4. Unprotected and polluted springs and streams.

5. Cesspools and privies polluting well water.

6. Filthy premises.

7. Surface ditches carrying filthy house water to the street gutter.

8. Flies carrying pollution from infected excreta to the food exposed in kitchens.

9. Use of polluted water by dairymen.

10. Personal carelessness and neglect to disenfect excreta and linen by those nursing the sick.

The above is quoted so that the fact can be pointed out that A SANITARY INSPECTION of the town and surroundings would have foretold every cause of the typhoid outbreak, which could then have been prevented by adopting proper sanitary measures.

(Continued in next issue.)

THE SANITARY ENGINEER

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Circulating amongst Sanitary, Heating and Ventilating Engineers, Gas Fitters, Sanitary Inspectors, City Engineers, Boards of Health, Architects, etc.

OCTOBER 15, 1915

THE WIDENING OF THE FIELD

A GREAT many of the craft have voiced their opinion that the field for work in the sanitary and heating business is very limited, and as the building trade is practically at a standstill there is little or no work to be gotten.

Now, let us analyze such an assertion and just see what kind of work is, in reality, within the scope of the sanitary and heating engineer.

It must first of all be admitted that sanitary and heating engineers have seldom if ever sought any other than what might be termed domestic, sanitary and heating work, and of course the very application of the word "domestic" does limit the scope of their work, in that it implies simply such work as is done for the general conveniences and comfort of the home office or factory.

Here are a few of the many industries, which should be, and could be catered to by the sanitary and heating engineer, thus widening the field for his activities:

The installation and repairing of all kinds of machinery in connection with bottling of various beverages, soda water factories, breweries, etc., with their vast amount of piping, both brass, copper and block tin, glass-lined as well as tin-lined lead, air pumps, filters, chemical works and in the latter, the art of lead burning would be brought into action, an art which is nearly dead, small refrigerating plants in connection with water coolers and apartment house refrigerator work.

Dairies find a lot of work which, if the practical sanitary engineer would apply himself to, could not be done better by any other class of mechanic than the sanitary engineers. Sprinkler fire installations, are becoming a common need in all our factory and office buildings and are, at this date, almost becoming a special line of work which, however, could be undertaken easily by every practical man in the business. There are so many problems involved in this latter work which would come very handy if applied to the ordinary every-day work of our craft. Farm machinery is another line which has not been considered to any great extent by the sanitary and heating engineer, and in actual fact, no other mechanic could effect such a transformation in labor-saving appliances as could this craft. The automatic stock-watering appliances which, to so many people appear to be shrouded in somewhat of a mystery are very simple problems to the practical sanitary and heating engineer.

The stationary vacuum cleaner has come to stay and means another line hitherto unknown to any other mechanic. It is possible to instal these machines in houses already built with very little cutting up of floors, etc., and should be pushed by every member of the craft. The sale of such a machine alone will bring almost sufficient returns to justify the sanitary and heating engineer in stocking at least one machine.

In the next issue of *The Sanitary Engineer* will be described a typical layout of piping for an automatic stock watering equipment which can not only be supplied from a pneumatic water system but also from an elevated tank.

If any of our readers come across problems on the farm in which they would like some assistance, they should write us giving as many particulars as possible and we will be only too glad to be of service to them.

PASS IT ALONG

NEVER in the history of the trade has there been so much thought given to getting business. This is, at any rate, a very hopeful sign. In this issue there appears the eighth article under the heading: "Getting after new business." The article shows how three concerns are conducting advertising campaigns. That the sanitary engineer of the future will be a better business man, no one

can doubt. There is a bright cloud on the horizon already. In many instances prices are being maintained, which was not the case in days gone by.

If one thing more than another is likely to be of general service to the craft, it is the exchanging of one's experiences, whether it be a business-getting experience or the adoption of a new method of managing one's business. Pass the idea along. If it is good for one it's good for all. No one man can get all the good out of one good idea.

The *Sanitary Engineer* will be only too pleased to hear of any ideas which are or have been tried out and found good. The long winter nights will soon be upon us and members of the sanitary and heating profession should get together in their own locality and discuss their experiences and grievances in a brotherly manner, instead of snarling at each other on the opposite side of the fence. Pass on the big idea and big results will follow. "Who serveth others serveth self," says Casson in a poem on service. No stone on the shore could ever become so smooth and round if it were not thrown together with others by the restless sea. No man liveth unto himself and never will; therefore, get together these coming winter evenings, send in the results of your meetings and let the *Sanitary Engineer* pass them along.

WHAT IS HONESTY?

AT one time honesty would have been defined as "Not stealing anything from anyone," or "giving bumping down weight, etc., of goods sold."

An honest person is by no means rare these days if such be the true definition, but, there are many persons who do not actually steal from their neighbors, and also give bumping weight, who are anything but honest. The person who gives overweight and at the same time is in debt to a merchant for those goods is by no means honest. The same person who does not set aside fair recompense for himself and for labor expended in his business could not in these days be classed as an honest person.

The following is a true story which actually took place many years ago in a country village in England:

A certain man whose brother was the squire of the manor fell ill and died. The estate was found to be over head and ears in debt, there had been debts contracted on all hands, and the revenue of the lands had been otherwise wasted.

One very old custom, however, had been kept up, that of gleaning. Every year the villagers were allowed to glean the corn fields, which was a very important annual event.

When, however, the new squire came to take up his home at the manor, he was looked upon as being very mean and "close-fisted." He would not allow game to be trapped and retained by the villagers and many other customary practices as well as the gleaning were discontinued, which had hitherto been looked upon as the free rights of the villagers. Much murmuring took place and in many cases open revolt against the new squire developed. However, the squire kept on his way and did not retaliate in any way. After a number of years had passed he called a mass meeting of all the people and addressed them in this manner: "My good people, when I took over this estate, I found it over head and ears in debt, the manor and all the lands were so heavily mortgaged that I had actually to take money which I had saved up for years to pay the interest on the mortgages. It was out of the question to think of paying any money off the principal unless changes in the management of the estate took place.

"I invested money in more modern farm implements, cut out gleaning, sold any game which was in the olden days allowed to be retained by those who cared to go out and shoot or trap it. I was looked upon as being mean, etc. But my dear people, I have learned during my business life that if I desire to be generous, I must first be just and honest.

"To allow the corn to be gleaned, to give game away to you when the estate was actually owned by someone else would not have been just. I therefore decided that to be just, would not, under the conditions in which I found the estate, allow me to give away that which was not mine to give. Conditions have now changed and to-day the estate is clear of debt. It is not indebted to any man, nor am I; and I am now going to be generous, as well as just. From this day forth, you, my good people, will live in your homes, rent free, you shall each have a certain portion of the fruits of your labors from the harvest fields, etc., etc.," and here the story ends.

But what a moral we do learn from this simple story. To-day the sanitary and heating engineer is not being honest to himself. He is estimating free, he is falling over himself for big contracts. He is too ready with his mechanical abilities and too slow in the charging for those abilities. He is dishonest to himself first. He is unjust to his customers by allowing them to receive more value than they pay for. He is dishonest to his men for allowing them to waste their time, for which he has to pay dearly, and in many ways he is not paid for service rendered. Yet in spite of all this the public at large think that the sanitary and heating engineers as a whole are the biggest thieves at large, as, indeed, they are to *themselves*, judging from their cash ratings in Duns and Bradstreets.

Getting After New Business

Sanitary and Heating Engineers in Large Towns and Cities are "Seeking" and "Finding" Business—Becoming Better Salesmen Every Day—Quite a Large Number are Realizing an Improvement in Their Business.

IN this issue are given three very fine examples of what various members of the trade are doing. Two refer to advertisements, and the other to a catalogue.

The advertisements are, as will be seen, to the point. They not only remind the readers that work should be done while the mild weather lasts, which if left until the winter sets in will not only cost more to execute, but cannot be done without a great amount of inconvenience being felt in the home. Questions of importance are asked as well as information given. No advertisement has a right to paper space unless the reader of the advertisement receives some recompense for the time spent in reading it. This is a point very often lost sight of by advertisers. When a person sits down to compose an advertisement three points should be given careful consideration. These are: Firstly, the value of the goods advertised to the buyer in return for the amount of money expended. Secondly, how to make the reading of the advertisement of service to the reader, whether goods are purchased or not, and lastly, to see that the sale of the goods advertised will be profitable to both parties involved in the transaction.

Cut price sales are one of the biggest curses to legitimate trading, and are in actual fact dishonest. If a buyer receives goods worth more than he or she pays for them, someone has lost in the transaction.

Bankrupt sales only benefit the buyer and in the end even the buyer pays through the nose, because whenever there are a number of failures, the basic cost of the failures must be born by those who are buying goods day by day. If there were no such bargain sales, prices would reach a normal legitimate level.

The two firms whose advertisements appear below are also to be complimented for the way they attend to their advertising, various changes have been noted from time to time, the present copy contains interesting information and is seasonable.

T. A. Cowan, Brantford, pays considerable attention to advertising and his latest venture is that of a beautifully illustrated catalogue. It is one of 40

(Continued on page 24.)

7 BIG REASONS

Why You Should Let Us Do the Plumbing of Your Home

1 We employ the best mechanics.
2 Our work is done up to a standard
3 We use only the highest grade materials.
4 Our plumbing fixtures are the best made in Canada.
5 If in trouble we serve you promptly.
6 Your money is left and spent at home.
7 A list of the people we are installing plumbing for will convince you that the quality of our work is the best

Let us give you an estimate.

W. H. DUSTAN
Sanitary and Heating Engineers
Phone 74 Bowmanville

Are You Prepared For Cold Weather?

Ask yourself these questions, and see if you are:—
Is your furnace in good trim?
Are you contemplating a new one?
Is your plumbing in good repair?
Do you intend installing a bathroom?
Is your stove in good repair?
Does it need new bricks, grates, etc.?
Will you be needing a new one?
Have you a stove you want set up?
Are your stove pipes all good?

After you have answered these questions, don't forget that we have the best staff of mechanics possible to carry out your requirements in any of the above lines. Better leave your order now and be prepared.

Bell Phone 90 J. McINTYRE Ind Phone 64
SANITARY HEATING AND PLUMBING ENGINEER
WHITBY, ONT.

Investigate

This Book Carefully

"IT'S BRIM FULL OF USEFUL ARTICLES FOR THE HOME, OFFICE AND FACTORY"

T. A. COWAN
WHOLESALE AND RETAIL
PLUMBING - HEATING - LIGHTING
81 COLBORNE STREET
BRANTFORD, CANADA

Popular Notes on Sewage Treatment

Several Articles Will Appear From Now on From the Pen of Mr. Roberts, All of Which Will be Found Interesting to the Progressive Sanitary Engineer.

THE development or evolution of sewage treatment work has taken many decades. Indeed, if we go into the earliest history it will be found that Moses was probably the first known sanitarian, and his command that all filth should be buried holds good to-day. We may, however, skip over the very early ages and even to within two or three generations ago when the congregating of large numbers of people in cities called for new and better methods of dealing with the filth, always produced in centres of population. It was the accumulation of filth in earlier days that made typhus the dreaded disease as it was lately in Serbia.

The burial of filth became impossible in districts where buildings were close together, and cesspools became necessary. With the distribution of water to all houses in a district came the water borne sewerage system and the earlier land irrigation schemes, which answered fairly well, so long as the weather was dry and the land was suitable, but troubles grew when the weather was wet and the increased volume of sewage had to be dealt with just the same when the land was already sodden with rain. As cities multiplied in number and the streams were so polluted as to be a menace to the health of the people Royal Commissions were appointed on different occasions to make thorough investigations into the subject. The public enquiries afforded theorists an excellent battleground to advocate "back to the land" treatment. Fabulous figures were given as to the annual loss to the nation of fertilizing matter which was run to waste to pollute the streams that should be kept pure. The other side brought forward their proposal which was to call for so much improvement as was within the power of the public authorities to carry out at a reasonable cost, and this was a safe procedure to adopt. Land treatment alone was often inadequate so it was supplemented by various kinds of tanks to remove the heavier solids; roughing filters to further remove the matters in suspension were started and step by step land treatment has now been almost entirely eliminated and the whole process is accomplished by improved tanks and filters. This change has been brought about largely by the study of bacteriology. When Pasteur made his classic researches into the action of yeast and the silkworm disease, he opened a new avenue of knowledge, which has flooded light on almost every branch of human activity, and afforded food for romance transcending all fiction for astonishing developments.

The bacteriologist found that little organisms were to be found in teeming millions at the roots of certain plants and that these microbes converted manure into suitable food for assimilation of the plants. He also found that there were microbes of many kinds—benevolent and malevolent—and they performed different functions. It was found that some microbes caused sewage to be changed into other constituents and it depended on conditions as to whether these changes were accompanied by disagreeable smells or not, and whether the changes were advantageous or otherwise. These conditions are now under control when the works are suitably arranged and managed. There have been many developments in the design of tanks, from the plain rectangular sedimentation to the Emscher two-storeyed tank. The former needs no description, but the latter actually consists of two tanks superimposed one above the other. The upper one receives the fresh sewage which in its passage through the tank deposits its load of suspended matter and this passes through slots into the lowar tank, where it becomes digested, by microbes, and is converted into gas, water, and mineral sludge. The action of a two-storeyed tank can be duplicated in separate tanks, as is done in some places. The tank effluent, passing out of these tanks is made to pass through filters of broken stone and gravel and by that means sufficiently purified to be discharged into a river stream.

The action of the filter on the tank affluent is to cause the impurities to be burned up or oxidized by the oxygen contained in the filter media, and the liquid to be nitrified by the organisms living in the fiter. Many investigators have been endeavoring during the last thirty years, to expedite this process either by blowing air into the raw sewage contained in tanks or into the effluent as it passed through filters, but until three or four years ago it was not a promising study, because the improvement effect was not commensurate with the cost.

The State Board of Massachusetts has been conducting experiments at Lawrence for upwards of 20 years and lately tried to cultivate an abundant growth of algae by the aeration of the sewage. It is well known that chorophyll plants such as algae absorb great quantities of oxygen from the air and impart it to the water. The result at Lawrence was that sewage was purified to a greater degree by this means. Following on this came Dr. Fowler's and Mr. Mumford's work of innoculating sewage effluent with a specific iron bacteria called M7, and pumping air into the tank with the result that a well classified liquid was produced. The next and even more interesting investigation was that made by Messrs. Ardern and Lockett at Manchester. In this case a quantity of sewage in a vessel was continuously aerated until it was purified, which took about six weeks' time. He then decanted the water, retained the sludge, added more sewage and aerated the mixture until it again was purified. By repeating this process until the accumulation of sludge had amounted to about one-fourth of the capacity of the vessel, they found that the sewage was then capable of being purified in six hours or less instead of six weeks as in the first charge. The process was named the "activated sludge" process because the changes were effected by the sludge in somewhat the same manner as already described took place in the filters. Andern and Lockett tried the experiment first in bottles then in barrels and by co-operation of Salford Corporation in large tanks always with the same results which were superior to those obtained at any ordinary sewage treatment works. The process has attracted great attention. The U.S. Federal Government and the Baltimore Sewerage Commission are now conducting experiments on similar lines but probably on a larger scale. Brooklyn, Milwaukee, Chicago, Regina, Urbona and other places are trying out the process and find it satisfactory. As no chemicals are used, and very little labor is employed the principal cost of operation is that of power necessary for pumping the air. This process appears to give good results whether the sewage is dilute or concentrated: it is applicable to sewage containing wool washery refuse or stockyard refuse, or brewery refuse, and so on.

There is no smell arising from this process. The writer had quantities of evil smelling sewage dumped into activated sludge tanks and in a few moments all disagreeable aromas had disappeared.

While it is unwise to prophecy what will be the outcome of the latest acquisition of knowledge on sewage treatment, the indications point to the possibility of radical changes

A Chat About Clean-outs

Giving a Few of the Whys and Wherefores of the Cleanout, Their Faults, Failings and Other Shortcomings Along with a Few Practical Hints as to How Cleanouts Could be Improved—Many are as Every One of Our Readers Knows, Merely an Apology for the Name.

By The Trouble-Man Out West.

PART 2

ACCESS doors are made for various purposes, besides providing facility for the unstopping of drains, yet the makers, in some countries, still retain that name for the plates they bolt on to the openings for cleaning out drain, soil and waste pipes. These plates are usually provided with 3, 4, 6 or 8 bolts, according to size, and, as a rule, are made with a fluted part cast on, which, when in situ, on the side of pipe or bend, ensures continuity of the wall of the conductor, as Section Fig. 1. This is a good feature of this style of clean-out.

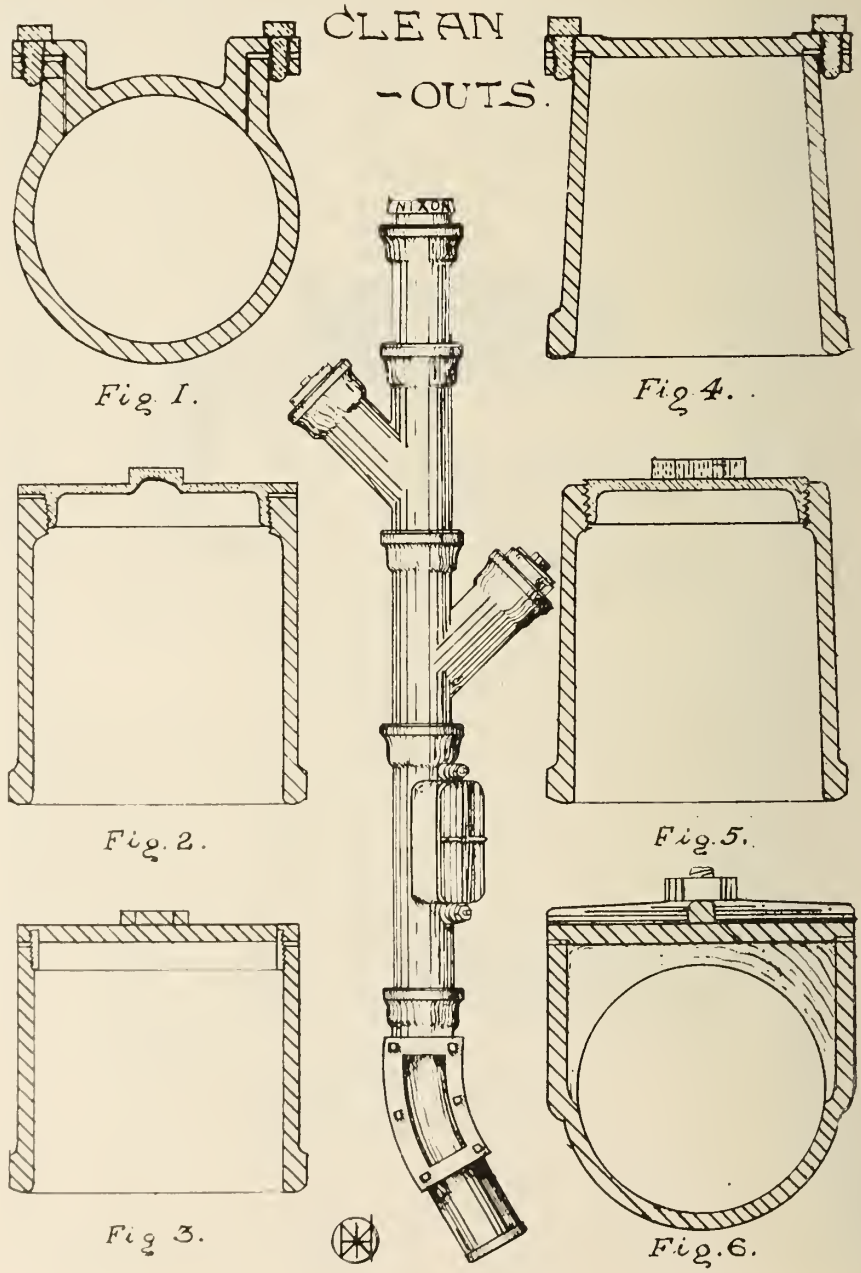
Full sized clean-outs are also provided for cleaning out grease and back-water traps; these are sometimes fastened directly by bolts, but, especially grease traps, oftener with clamps, and a rope packing is used to make an airtight and watertight joint.

Grease trap covers have to be removed so frequently that the perishing of this packing or gasket is noticed and easily rectified.

It is in those cases where, principally through good care and the excellence of the sanitary construction, the clean-out remains for years in situ without removal that the great trouble occurs. The gasket being exposed on its edges to the influences of various degrees of temperature and humidity, sometimes aglutinates and sometimes decays and crumbles away leaving the clean-out unsealed, and allowing the continual escape of sewer air into the house. Sometimes the careful sanitary engineer who finishes the job, foreseeing this, throws away the gasket and makes the cover on with good old red-lead and string; then the careful housemaid having soon after left to marry the careful sanitary engineer who has hung up his shingle, a green hand from the country is installed as maid, and being unused to modern houses, she, after cleaning up the bedrooms, throws her washing water down the w.c. bowl, and does not think about removing her floor cloth or bar of soap from the nail until it has passed round the trap of the fixture, and before the trouble man can hook it back out of the bend that makes the connection between the house drain and the main sewer, the cover of the clean-out has been actually cut to pieces in the process of removal. Such is the affinity of red-lead cement, aided by time, to brass and iron.

Now the city is not liable for the provision of a new cleanout cover, and the troubleman, being a person of little skill and less knowledge, thinks the least said the soonest mended; he does not realize the danger of admitting sewer-air into the house, so he just pushes a piece of a potato sack into the orifice and goes on his way rejoicing.

It is not until the following fall when the whole family is down with mumps, that the proneness of all the persons in the house to relaxed throat, for some



Sheet 1

time past, is traced, by the joint efforts of a competent sanitary engineer and medical adviser to the ingress of sewer air through the unsealed cleanout. Now a cleanout that sounds well in print, is one that according to its specification, is full-way inside and has five brass threads projecting from a heavy metal disc, and which has no outside projections to interfere with the caulking of it into a hub, as Fig. 3. Where this cleanout falls down, however, is in having two flanges of cast iron between which to place the gasket as the process of corrosion tends to aglutinate the cover to the sleeve, and when the sanitary engineer or the troubleman gently taps the edges with a hammer to persuade them to part company, the disc does so piecemeal, the casting in of the brass threaded ring having contributed to this end by weakening the cover.

This weakness is overcome in Fig. 4, but at the expense of obstruction to the entry of testing plugs and drain rod plunger. It also has bolts which are liable to be broken or mislaid, and are bad to remove when covered with water, or sewage. The cast iron faces also aglutinate, the gasket tears on removal and when replaced is faulty and leaks.

Fig. 5 is an effort to "cut out" the gasket, but the writer is only one of very many that has been bothered in their water tests through the leakage of these cleanouts. I recently had to use a 24-inch wrench extended by 5.0 of pipe to remove a 4-inch cleanout of this type, from a choked connection, though bubbles formed of the coal oil put on it to lubricate the threads and facilitate removal.

Another objectionable feature of this type is the projection of the cast iron threads and their consequent certainty of being at least sufficiently broken out by the couplings of drain rods to prevent them being either airtight or watertight. It is also impossible to insert a testing plug or full sized drain plunger.

Fig. 6 is an attempt to make a cleanout that can be utilized for cleaning out the pipes on either side of it; this is both unnecessary and undesirable, and the writer has seen these cleanouts left in very bad shape in a western province in which they are much in vogue.

There should be a cleanout fixed, in the direction of the flow, at or above each change of direction, and at distances of never more than fifty feet from each other.

It is generally recognized that cleanouts, access doors, or inspection eyes, as they are variously called, are not ornaments, they are for use, and when, from any cause, there is several feet of water or sewage in the cellar, and the city troubleman is called in to let it out through the cleanout of the sanitary sewer, he doesn't want to be fooling round under water with small bolts, he needs something he can take a wrench to and with one turn loosen sufficiently to take off with about four more turns with his fingers. He should also have one that he can confidently replace with the assurance that it will have a perfect seal without him having to carry around a various assortment of different sized gaskets, or luting to patch up after him.

Figs. 2 and 3—Sheet II.

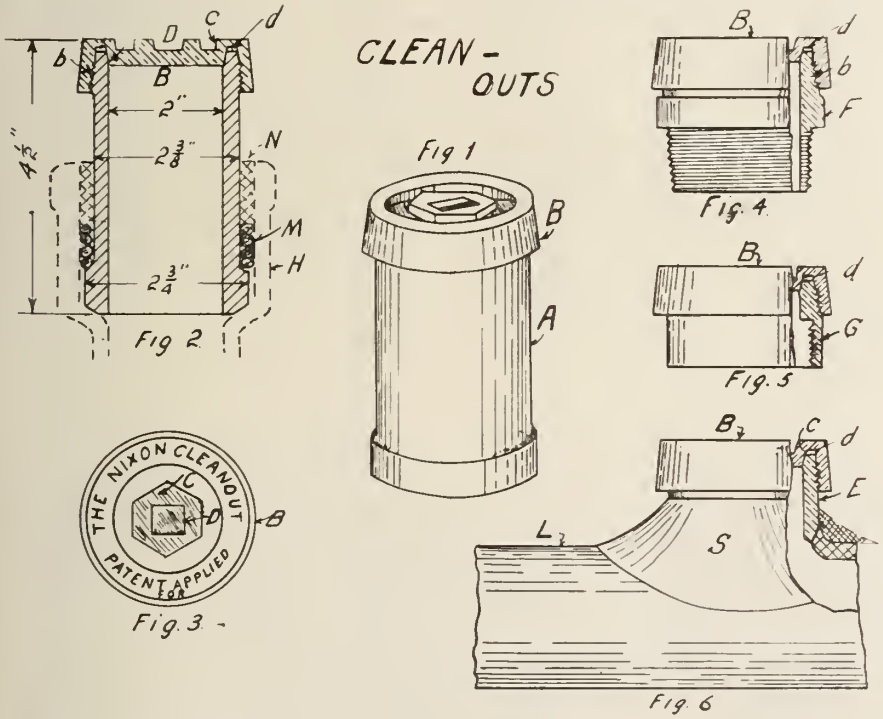
The various faults of the various cleanouts presently on the market moved the Canadian Institute of Sanitary Engineers at their last convention to instruct their Research Committee to receive designs of better cleanouts and to submit the best of them to the next meeting for adoption for universal use. One of those already submitted is Fig. 7.

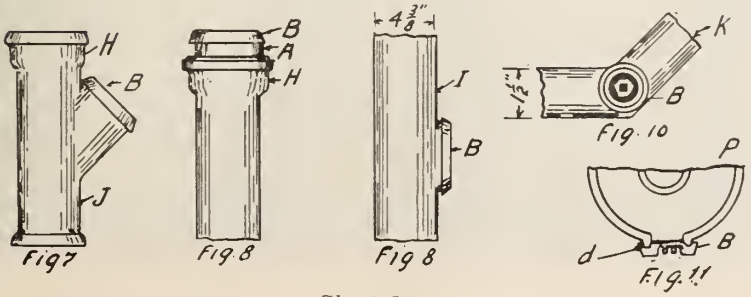
The fitting consists of, for use with C.I. soil or drain pipe, a full way C.I. sleeve or cylinder A, beaded on the spigot end, for caulking into a hub in the same manner as a pipe spigot, as shown in Fig. 2, in the accompanying print.

The other end a, is turned or machined at right angles to the perimeter of the body of the sleeve, and has on the outer edge a slightly tapered thread b, and on the inner edge a bevelled surface c, which articulates with the inside edge of the recessed gun-metal or brass cap B, which seals the orifice. The outer ring of this brass cap is threaded inside in conformity with the tapering thread b on the end of the sleeve. The operation of this thread b opens and closes the cleanout.

A sealed annular space d, is provided between the squared end of the sleeve and the interior recess of the cap which is for the purpose of containing a combined extra sealing agent and lubricant, which according to climate, may be heavy grade oil, axle grease, tallow, hard fat, beeswax, or a combination of either, with graphite. This renders the opening of the cleanout, after any lapse of time, not only possible but certain and easy, without damage.

The operation of the cleanout is affected by means of a combined outer hexagon nut C, with inner recess D for which I advocate the use of a special duplex steel key. It is not practicable to release the cap of the smaller sizes, at least, with a stillson, or similar wrench, and this should preclude the possibility of their removal, and probable improper replacement by unauthorized and irresponsible persons.





Sheet 2

The sleeve of this fitting can be also formed in brass, with a short tailpiece E, for wiping into lead pipes and traps, as Fig. 6, and allows of being directly formed, or built into brass traps and bends, as Figs. 11 and 10, at any requisite angle.

It may also be formed with hexagon, or any multi-sided nut, and nipple F, or coupling G, for Durham-work, as Figs. 4 and 5.

Fig. 7 shows the cleanout formed on a "Y" fitting. Fig. 8 caulked into the hub of a pipe, and Fig. 9 built on to the side of a pipe.

The advantages of this fitting are:

(1)—It has no bolts to break or nuts to lose.

(2)—In addition to no internal obstruction, there is an absence of any inside threads to be damaged by wires or the couplings of drain rods, or to damage the cane of rods, or the rubber cushions of test plugs.

(3)—The provision of an absolutely airtight, and watertight seal, without the use of any sealing agent that can either harden or decay. (The packing used to staunch the flanged plugs of cleanouts usually aglutinates to such an extent that the removal and destruction of the plug coincides.)

(3)—The ease of removal without damage, after any lapse of time, and its easy replacement with perfect seal, puts the Nixon cleanout in a class by itself: owing to its self-lubricating property, it requires no excessive force to operate it.

(5)—The impracticability of its removal, owing to its recessed cap and nut by unauthorized persons.

(6)—It is caulked into hub of pipe, or fitting and is of standard fitting, size and strength.

(7)—It is only slightly more expensive than the inferior cleanouts hitherto in use.

MANUFACTURE OF BOILERS AND RADIATORS

(Continued from page 15.)

this firm has a large output. Push nipples of the spherical type as used by the company allow the component parts of a boiler to adjust themselves in use so that undue strains are avoided and all possibility of leakage is entirely prevented.

A well equipped machine shop and tool room are, as might be expected, a necessary adjunct of such a plant, and contribute to that quality of product for which the company have earned quite an enviable reputation.

GETTING AFTER NEW BUSINESS

(Continued from page 20.)

pages, 9 x 12, and is printed on heavy coated stock. The illustrations as a whole are of a high class.

We reproduce a view of the cover herewith. This catalogue covers almost every line which a domestic sanitary and heating engineer can handle; the prices are quoted in many cases or wherever possible—electric fixtures, electric washing machines, electric vacuum cleaners, electric stoves, fans, heaters and all kinds of electric utensils for use in either the kitchen or bathroom.

Pneumatic water systems with septic tank and other sanitary equipment for the country home and farm building are described in this splendid catalogue.

Heat regulators, controls, garage heaters, together with the heavier and larger bathroom fixtures, and gas stoves are included. Pumps of all kinds receive no small attention. Finally there is an excellent showing of drain tile pipes and branches, coping tiles, etc.

But the most important and underlying feature of the catalogue is that of service, first, last and always. Without doubt the housewife who possesses one of these catalogues could not fail to find something to be remembered and at some future date call upon the T. A. Cowan Company.

BAD BUSINESS

Beguiled by the attractive wording of an advertisement appearing in a trade paper, a trusting investor from the North bought a sawmill in the White River bottoms of Arkansas. When he went down to take over his newly purchased property and to assume its management the recent owner met him at the railroad station and bade him welcome.

As they climbed into the native's buggy to drive through the woods to the spot where the plant was located, the stranger said:

"I wish you'd give me a few hints right off about how to run this business profitably. You see I'm a little green at this line. I've been a lumber dealer all my life, but I never undertook to handle the raw material before."

"Well mister," stated the Arkansan frankly, "I wish I could give you the advice you want, but I reckin I jest don't know myself. My father-in-law died and left me this here mill in his will. My two boys helped me to run her and there wasn't no other hands, and so I never had to pay out nuthin' for wages. I stole all the timber I cut, and my stepbrother, who's the division freight agent for the railroad, used to ship all my lumber out for me so I never had to pay no freight charges—and last year I come out twenty-seven hundred dollars behind."—S. E. Post.

FIG 8 HEATING BOILER ASSEMBLY DEPARTMENT.

What Must We Do to Insure Prosperity?

An Address Delivered by Lt.-Col. J. B. MacLean, President MacLean Publishing Co., at the Annual Banquet of The Canadian Wholesale Hardware Association.

THE immediate outlook for business in Canada is more promising than it has been for several years, but the more distant prospect is causing much anxiety to those who have invested all their life savings in Canadian industry. And, this means practically every business man, and, particularly, every manufacturer. Very few have been able to withdraw their profits and put them into endowment insurance, bonds and mortgages and similar investments to take them through times of depression. On the other hand, nearly all have had to put not only their profits but pledge their credit for money, for business developments and extensions to keep up with the abnormal demands due to the recent growth of the country.

I am constantly asked by business men, investors and others interested in Canada:—What of the future? Will times be good or bad after the war?

It is difficult for anyone to say. I was in Berlin when the war began, and discussed with the director of one of the greatest German banks—one of the ablest bankers in Europe—the whole situation as it would affect the world's business and financial conditions. He was undoubtedly prepared for a long war, but, of these conditions after the war he said no man can tell. The only possible basis on which to work, he said, was the period of the Franco-Prussian war, but everything now was, and, after the war, would be so different that deductions were interesting but useless.

Some months ago I asked Colonel Denison what the war history of the world showed. No man here as you know stands higher in his knowledge in this respect but particularly in his capacity to grasp the real results and lessons of history. Running rapidly over the great wars from the earliest times he showed me that, no matter how weakened in men and materials by years of war, the winning nations at once entered upon long periods of tremendous prosperity, sometimes extending over a century.

A study of the general situation, and of local conditions in countries that compete with us, leads to the conclusion that Canada is the country that is most ready, and therefore, has a greater opportunity than any other country in the world to benefit by the war. I want to lay emphasis on the word "opportunity." Large areas of rich farming, lumbering, mining and fishing have just been opened by railways, and the population to work and the money to develop these resources are in sight. The war will release millions of soldiers and munition factory workers to whom Canada is favorably known and who would like to settle here; and, we are next door to the people who will have more money for investment than any country in the world, and who would rather put it into Canadian development than anywhere outside their own boundaries.

But whether we will be prosperous or not; whether times will be good or bad in the next twenty-five years will depend very much upon whether we will organize ourselves to grasp these two opportunities.

The matter will be settled in the next few months or at most in a year or so, and the responsibility centres on one man, Sir Robert Borden, who in his capacity as Prime Minister is General Manager of Canadian business. If Sir Robert Borden gets about him the right men to organize, direct and do the work of building up Canada, we can be made the most progressive and prosperous corner of a world, that will, for a great many years, be far from prosperous. If he does not, the population and wealth will go to our greatest competitors, the South American nations, which for some years have had a public service better equipped and more efficiently directed than ours; and which since the outbreak of the war, have tremendously increased their efforts to secure money and emigrants. Conventions in this connection have been recently held in Washington and New York, and branch banks from the United States have been established in these Southern Republics. Even before the war began 200,000 Russians of the best class were arranging to take up Canadian farms—the beginning of a great movement, it is said. They preferred Canada, but they were finally turned to South America, by the more intelligent work of Spanish-American officials. The latter were appointed because of their capacity to do the work, while the Canadian Department of Immigration is overmanned with officials whose only recommendation was the assistance given in some election contest.

Settlers and production mean prosperity to all Canada, but they are of direct and very vital importance to the hardware and metal industry. If we do not get settlers many departments in this industry will have smokeless chimneys and idle workers. I need only mention the stove industry. These manufacturers have passed into, through and out of a period of great prosperity in the last 20 years. That period coincided exactly with the successful administration of our Immigration Department. Statistics show, under incompetent management, a steady falling off in settlers until in 1896 we got only 16,835. In that year one of the ablest men in public life became our Minister of Immigration. He was a good organizer and executive. The story of his work is an object lesson to business men and particularly sales managers. Under his direction the very best type of settler began to pour in. In his first year, 1897, they increased to 21,716, and from that the arrivals climbed steadily to 402,432 in 1912. Under him our Immigration Department was a highly efficient business organization. With his retirement it has relapsed into a political refuge. The greatest question before Canadian business men and their workers now is the putting of our immigration work in the hands of some great executive who will build up an organization that will secure for us our full measure of settlers from the United States now and from among our Allies after the war is over. He should have the power, regardless of party politics, to secure, without regard to salary, the men whose ability, energy and knowledge of the country best fits them for filling the various positions. We can never get the best results while one party or the other, when in power, appoints men as immigration agents in recognition of party service, who are no more suited to the job than they would be to the pulpit or the bench.

Our Immigration Department to-day is rotten and the same conditions exist in our other Departments which vitally affect the prosperity of the country—in our Department of Trade, our Department of Labor and our Department of Agriculture to a lesser extent. In our Department of Trade we have in Sir George Foster one of the best speakers in public life. He is a credit to his constituency. I vote for him, help him financially in his campaign, and hope to see him re-elected. On the lecture platform I believe he would crowd the houses and could easily earn $10,000 to $15,000 a year, but, as Minister of Trade, he is filling a Sales Manager's place, and as a salesman no one here would pay him $10 a week. There is no man in the Government more anxious to serve his country. And the same may be said of his colleagues, but the fact is they do not know how.

When I returned a year ago from Europe, where I had been going annually for the purpose of studying business and financial conditions, I was shocked to find that Canadian manufacturers were getting few British war orders, and our factories were idle, while millions of dollars had been placed in the States. The British buyer would give Canada the preference, but it is a fact that they were not aware that certain products in which we excel were made in Canada.

I at once began a campaign in The Financial Post, in which I was supported by the various business and technical papers, for the purpose of awakening our Government and the manufacturers themselves to what we were losing..

One of the colleagues of the Minister of Trade and Commerce came to me to argue that it was no part of the duty of the Minister of Trade to secure orders for Canadian manufacturers. After discussing it for some time he realized that the Minister of Trade had an entirely wrong conception of his duties, and shortly after the Government made the following official announcement:

> "The Department of Trade and Commerce is now, for the first time, taking cognizance of, and assisting in every possible manner the Made-in-Canada movement. In the past it was felt that the Department, while always ready and anxious to assist in every possible way Canadian manufacturers and producers to increase their business at home and abroad, it was impossible officially to recognize the Made-in-Canada campaign. However, conditions have changed to-day, etc."

If a Department of Trade and Commerce was not established for the purpose of developing and promoting the sale of Canadian products, what was it for? From a remark made by a former Minister, Sir Richard Cartwright, there is reason to believe they are more interested in imports than exports.

I think you will all agree with me in saying that our system of selecting Cabinet Ministers is all wrong. Germany has made her great successes in business and war because the Kaiser had the power and capacity to gather about him the great business leaders of the Empire.

We ought in this emergency to adopt the same policy and make it permanent when the emergency has passed. No personal considerations or party affiliations should be allowed at this time to influence us or prevent us from organizing to get the best out of an immediate future that will be mighty gloomy if we do not.

It depends very much upon the Ministers of Trade, Agriculture, Labor and Immigration whether you will be able to keep your stores and factories running in the future to their average capacity; whether you will be able to find work for present employees; whether you will be able to pay dividends to those who lent you money to establish your business. It all comes back to whether Sir Robert Borden will break away from system and tradition, and, instead of depending upon the men elected to the house, secure, particularly for our Immigration and other Departments, the best men in the country.

Can we get them? I believe our big business specialists—the men at the head of our great industries would sacrifice themselves and "do their bit" just as our brave soldiers at the front are doing theirs. To attain these positions these big men must have had the qualities we need in this emergency: imagination to plan and organize the great resources at their disposal; energy to get things done, and done quickly, and a capacity to get about them and train men. They are not talkers, they are workers. They do things and get things done.

Knowing how well Sir Robert has conducted the affairs of the nation so far, it is but natural to believe that he would gladly take advantage of any opportunity or excuse to strengthen his cabinet, feeling, as he must, how great is his responsibility for the future of Canada.

A "NEAR" WORLD SERIES FRUSTRATED

On Wednesday, Sept. 22nd, an attempt to pull off what promised to be the game of the season, Sanitary Engineers vs. Consumers' Gas Company "All Stars," was nipped in the bud by the failure to turn out of the whole of the Sanitary Engineers' nine. Various conjectures regarding the absentees were made. Some thought that a big contract was attracting their attention, others that the Woodbine looked better than the Motordrome, and others that the Lake and Niagara Camp were the attraction.

However, wherever they were, they missed a real "swatfest." The weather was ideal and all the players were "In the pink." A six innings contest between two "Hand picked" teams was thoroughly enjoyed by participants and spectators alike.

General John Wright, who acted as umpire, had all his work cut out to keep the boys in order, every trick known on the diamond being tried with varying success. Diminutive Dave Houston, manager of the Congasco team, made a new record for base running. Norman Swanston and his boys were right there with the big stick.

Editor Newsome, with his inseparable companion, the camera, obtained one or two really good souvenirs of what turned out to be quite a pleasant afternoon despite the small attendance drawback.

The next game between the Sanitary Engineers and the Consumers' Gas Company, will be looked forward to by everybody present.

NEW APPOINTMENT

Charles Tennont of North Sydney has been engaged by T. R. Ehrhardt & Sons Sackville, N.B., to take charge of their plumbing department.

This concern run a very attractive and well laid out hardware store and electric department and employ men in each department who thoroughly understand his individual line.

This is the only way to run a department successfully and at the same time give satisfactory service to one's customers.

GETS HEATING CONTRACT

Messrs. Bernhardt and Spalding, Preston, Ontario, received the contract for the installing of the heating plant of the new Hurlbut shoe factory, in that town. The heating will be done by low pressure steam and will require a vast amount of piping. The factory is well on the way and the roof is nearly completed. The new factory when finished will be one of the finest and best equipped for its purpose in the country.

JOINED THE COLORS

Mr. Walter Robinson for the past ten years a member of the disinfecting staff of the Department of Public Health, Toronto, has joined the 10th Medical Army Service Corps, now stationed at the Niagara Camp.

"Only Passed On"

Quite a number of the Montreal craft attended the funeral of the late Mrs. James Robertson, wife of the late James Robertson founder of The James Robertson Co., Ltd.

"It does not seem so long ago after all since the late James Robertson passed into the great beyond" said one of those members of the plumbing trade, and the passing on of Mrs. Robertson brings back memories dear to many a one who was personally acquainted with James Robertson.

The James Robertson Co., Ltd. is one of the pioneer plumbing supply companies which will never be forgotten, and as another member of the craft stated: "Many's the business trial and tempest which the late James Robertson helped a fellow craftsman through to my knowledge."

It's not what we are which will be remembered in years to come, but it's what we have done, in spirit and in truth. The late Mrs. James Robertson, we know, must have assisted considerably in building up the present institution whose products play such an important part in the sanitary field throughout the Dominion of Canada.

We doubt very much if there is a town of any size which does not contain some of the goods manufactured by this pioneer company. Such being the case we cannot fail to appreciate the services rendered by the late Mr. and Mrs. James Robertson, whose memory is dear to all who came in contact with them. The Sanitary Engineer joins with the trade as a whole in extending their heart-felt sympathy at this time, to the family thus bereaved, feeling that their noble parents have fought the good fight and entered their rest beyond.

1—Consumers Gas Co.'s team. 2—A few of the spectators and players. 3—Sanitary Engineer's team.

New Sanitary and Heating Goods

BULLETIN NO. 11

The C. A. Dunham Co., have just issued their new bulletin No. 11. It describes the very last word in vapor steam heating.

It is illustrated with drawings showing how such systems should be installed, and will prove of interest to every heating engineer. Those desiring to procure this useful literature should write to C. A. Dunham Co., Devenport road, Toronto, Ont.

NEW BULLETIN

The Fort Wayne Engineering & Manufacturing Co., Fort Wayne, Indiana, have recently published their Bulletin 4073.

It describes their several styles of pneumatic water systems and how they are connected up under various conditions, along with prices and other useful information about pneumatic water systems.

INTERESTING FOLDER

A hen walked through a clay puddle into a sugar house, says the Hotstream Heater Company, of Cleveland, Ohio, in a new folder just issued, and it might be of interest to know why such an incident should bear any relationship to the perfection of gas water heaters. Those who would like to read the story through should write to the above named company. They will no doubt be surprised at the way the story goes if they do write. It's worth a couple of cents anyway.

EMPIRE WATER SUPPLY SYSTEMS

Above is the title of a very interesting booklet which is being distributed to the trade by the Empire Manufacturing Co., London. This booklet not only serves as a catalogue of a few of the many lines they manufacture, but also contains very useful information, to every one engaged in the trade. These booklets may be procured free upon application to the above company.

NEW PNEUMATIC PUMP

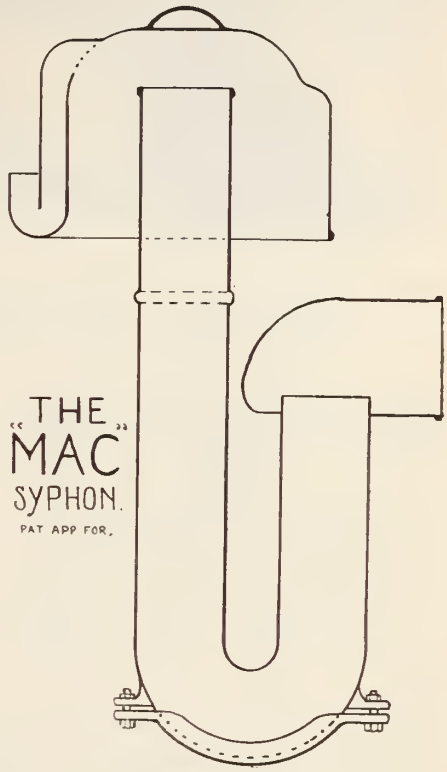
The Ontario Wind Engine and Pump Co. have recently put on the market another new line of pumps, both single and double. They make some very novel claims for the one shown herewith, viz., type T. This pump is really two pumps in one, in that its make-up comprises two cylinders, pistons, two sets of valves, air chambers, etc., thus making it double the capacity of a single cylinder pump of the same diameter and stroke.

There are not only the regular air chambers, but also two vacuum chambers as well. All bearings are easily adjusted, and are of heavy bronze. This pump is one of a series of what is termed "The Toronto Silent Electric House Pump type T."

Further information regarding full specifications and prices may be obtained from the above company, Toronto.

NEW SEPTIC TANK SYPHON

Those sanitary engineers who are engaged in the installation of septic tanks will be interested to know that the West Toronto Foundry Co. are making a syphon called the "Mac" Syphon. The manufacturer claims that it is positive in action and is fully guaranteed. Those desiring fuller information may procure same by writing to the West Toronto Foundry Co., Corner Mulock and Junction Avenues, West Toronto.



The Mac Syphon.

Toronto Silent Electric House Pump Type T. Capacity 300 galions per hour.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

HOW TO CONNECT TWO RANGE BOILERS TO A LARGE KITCHEN RANGE

Editor Sanitary Engineer.—Some of the range boiler connections you have described are very interesting and if you will allow me I would like to ask you how you would advise connecting two range boilers to one large kitchen range.

The range has an extraordinary large water front, and a big fire is kept on constantly. I find the people in the house do not get enough hot water in volume, though the water in the one boiler often boils and gets too hot. It is a 40 gallon one.

I propose to connect another 40 gallon boiler to the same water front but am not quite sure how this should be done so as to enable the water in each boiler to heat up about the same time.

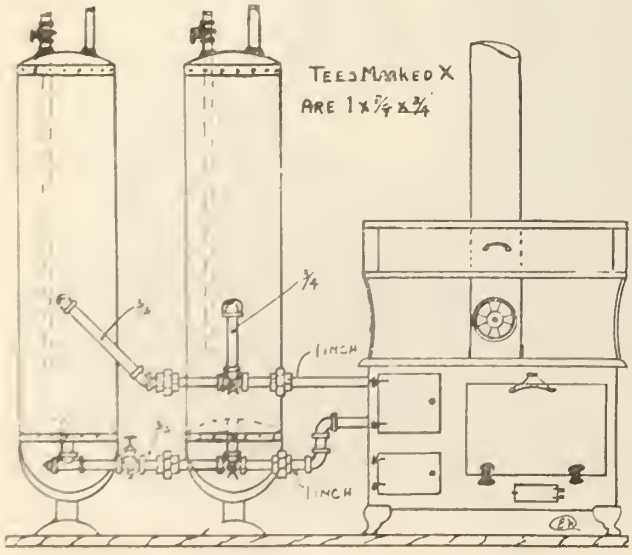
Will you kindly inform me through the pages of the Sanitary Engineer?

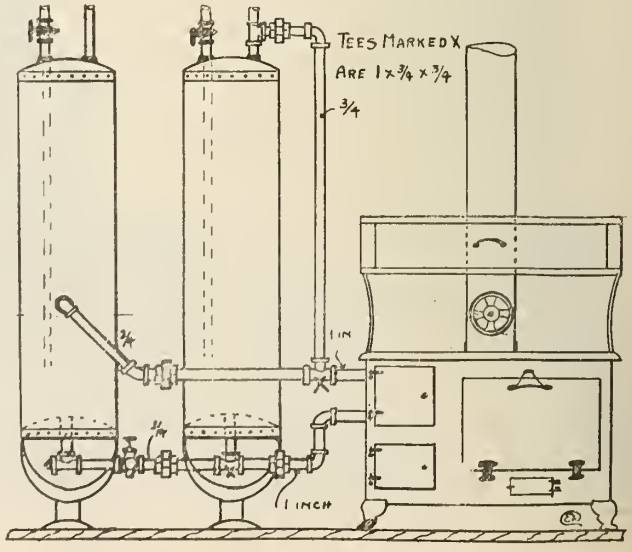
R. B. C.

It does not often occur that two boilers are to be connected, at the same time there is no reason why this should not be done. Many a time it would be far better to install two boilers than one large 60 or 80 gallon one. R. B. C. is wise in deciding to add another boiler to the present one and his customer will appreciate the fact when he might easily have been asked to scrap the present boiler and have one larger sized boiler, which would have cost him more money.

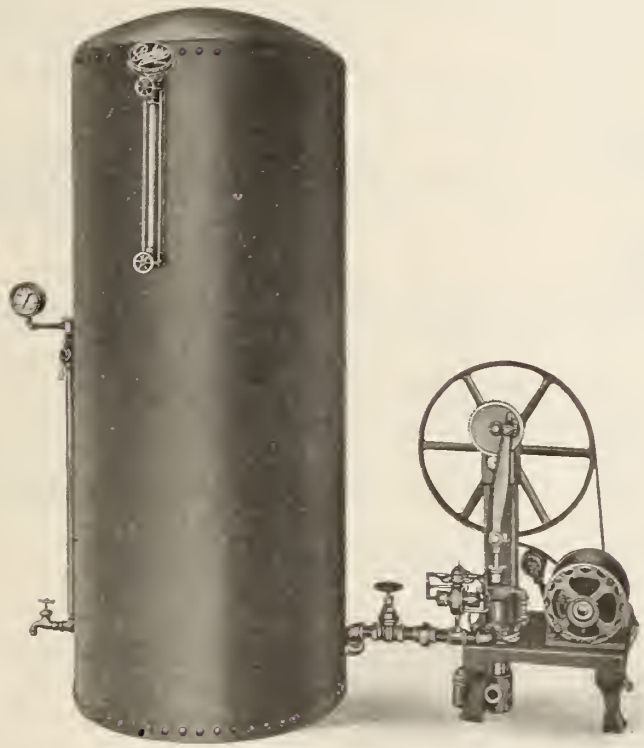
A little care should be exercised when installing, or, shall we say, coupling two boilers together. Fig. 1 shows a very simple method and, as will be seen, we have given the size of pipes necessary. Some heating engineers have been known to set the boilers at such a height as would require the top pipe to come out in line with the side tappings of the boiler. We do not, however, favor such a method. It will be seen that the two tees at the boiler nearest the range are 1 x ¾ x ¾, and all the pipes and fittings between these tees and the range are 1-in. The piping from the tees to the second boiler will be seen to be ¾ in. Too much care cannot be given to see that threads do not run up to the shoulder and that all pipes are reamed, and all unions should be of the metal to metal type. We have mentioned these latter precautions several times in this series, but we have new subscribers coming in every day, and it is for their benefit that we take the liberty of repeating these small though very important matters. Fig. 2 shows another method where the first boiler is connected with what is known to some as a quick-heating connection. This is often necessary when the boilers are too far apart to get the necessary pitch for the piping to the second boiler. The two boilers would be supplied with cold water by the one service and the two hot-water pipes would have to be connected into one hot-water pipe.

(Continued on page 30.)





MADE IN CANADA



500 Series—250 Gals. per Hour

There may be an apparent saving of a couple of dollars in buying a "piece-meal" outfit, but subsequent troubles cost a lot of money—Peerless Water Systems don't give trouble.

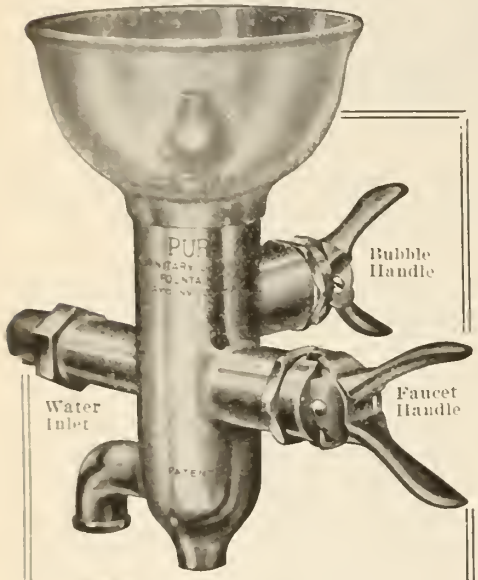
NATIONAL EQUIPMENT CO., Limited
TORONTO, ONTARIO

I BELIEVE

In Safety First and always.
In providing for the Health of my Fellow-Workmen.
In Light and Air and Sanitary Working Conditions.
In clean, fresh drinking water for everybody.
In the Safety, Economy and Man-betterment of the

PURO SANITARY DRINKING FOUNTAIN

(MADE IN CANADA)



The loss of a man through impure drinking water is a crime that "the front office" must bear.

An ugly statement isn't it? But true, absolutely.

When a man comes to work in your factory he puts his health in your keeping.

Are you willing to take chances on such a trust?

Impure drinking conditions are responsible for more tragedies than any machine ever built.

Apply the "Safety First" Principles to your water supply; don't deny your men a clean fresh drink of water.

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H. L. SEYMOUR, B. A. Sc., A. M. Can. Soc. C. E.

BOX 95. SANITARY ENGINEER TORONTO

THE QUESTION BOX

(Continued from page 28.)

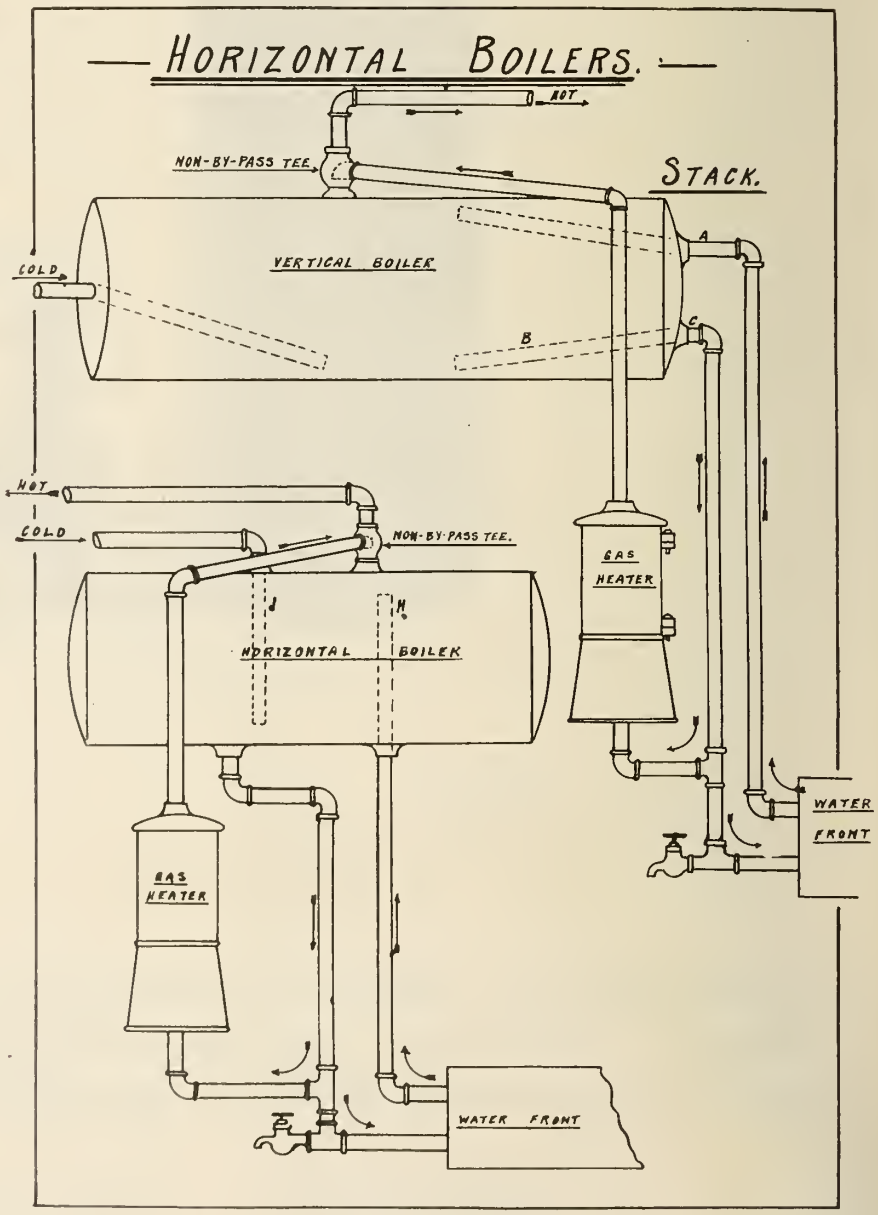
HOW SHOULD THIS GAS WATER HEATER BE CONNECTED?

Editor The Sanitary Engineer.—I've been called in by a customer of mine to connect a gas water heater to a horizontal range boiler, which is at present connected to a range water front in the basement. They are not getting sufficient hot water at present, and I'm not really sure whether this boiler is connected up right. There are so many elbows and turns that I can't very well send you a sketch that I'd even understand myself. Will you please show the right way that this job should be piped complete with a gas water heater?

A NEW READER.

We have submitted two methods showing how such installations as required may be made. It will be noted that the upper drawing shows a method adopted with the regular standard tappings on the ordinary vertical range boiler. This is a very handy way, and does not require specially tapped boilers. It will also be noted that we have shown a by-pass tee. These tees are used with a view of preventing the water short-circuiting, and their use on all connections where the hot water pipe from the boiler to the fixtures is taken off the same line as that to which the top connection of the gas water heater is made is desirable.

The lower drawing shows an installation under slightly different conditions. The boiler is a specially tapped one, and is if anything a more effective working installation. In the drawing the boiler appears to be of a smaller size, but that is not of any importance.—Editor.



Two methods of showing how basement range boilers and gas water heaters may be connected.

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The Knickerbocker Regulator

It is a positive remedy that is easily applied to the open or closed systems of hot water heating.

Entirely automatic.

Connects with one-inch nipple to outlet of expansion tank.

Makes a hot water system equivalent to a low pressure steam plant.

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Reduces the size of pipes and fittings.

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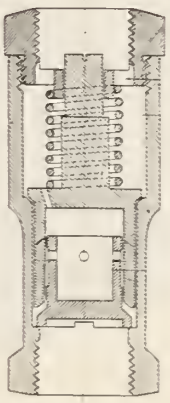

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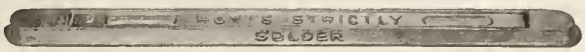

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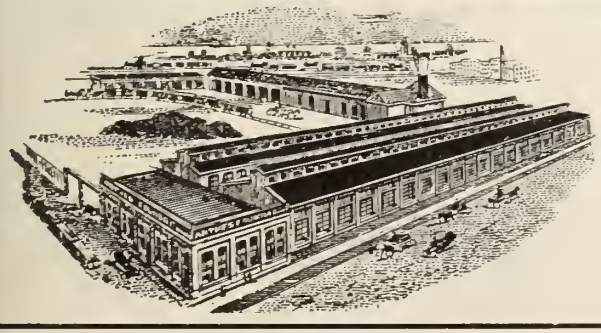

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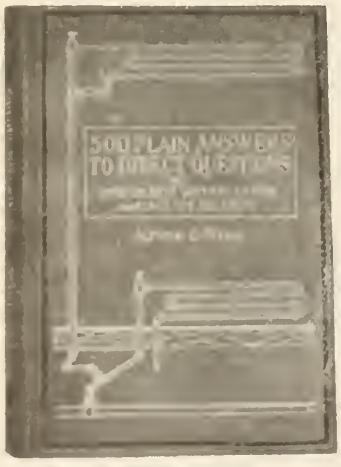

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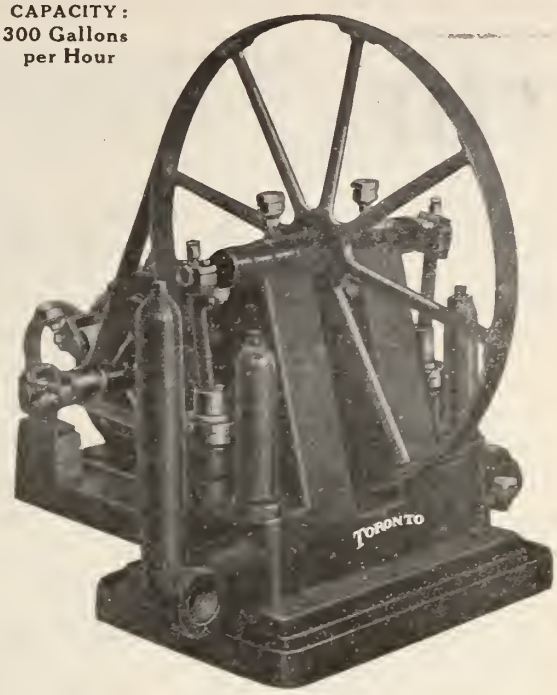

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The many exclusive features of this remarkable pump are fully explained and illustrated in our special pump folder "T." A card will bring it to you.

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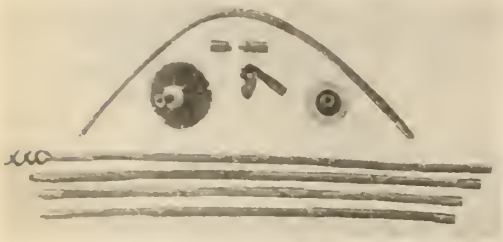

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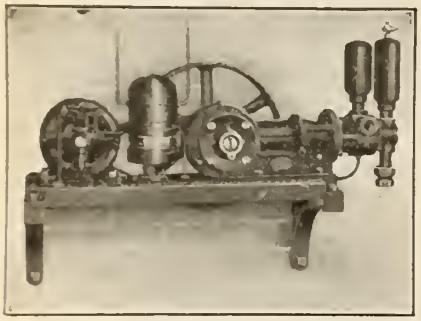

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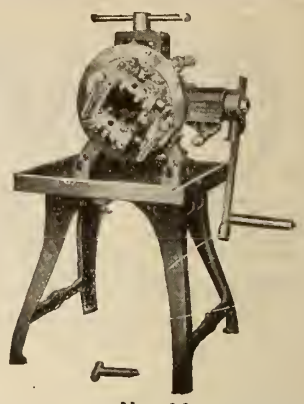

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It is indestructible. A great fuel saver. Its action is visible at all times.

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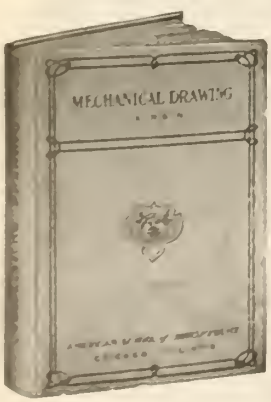

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143-153 University Ave., Toronto

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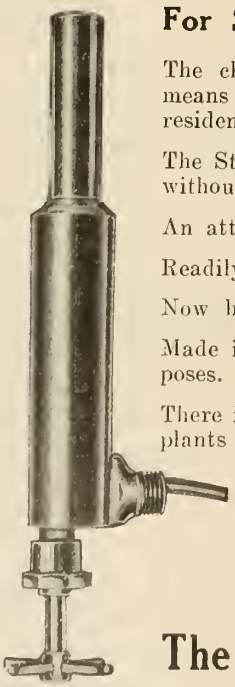

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An attractive nickel-plated device.

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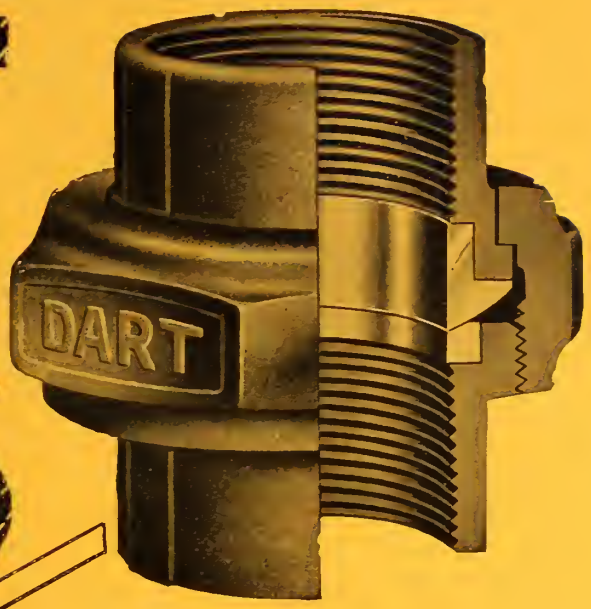

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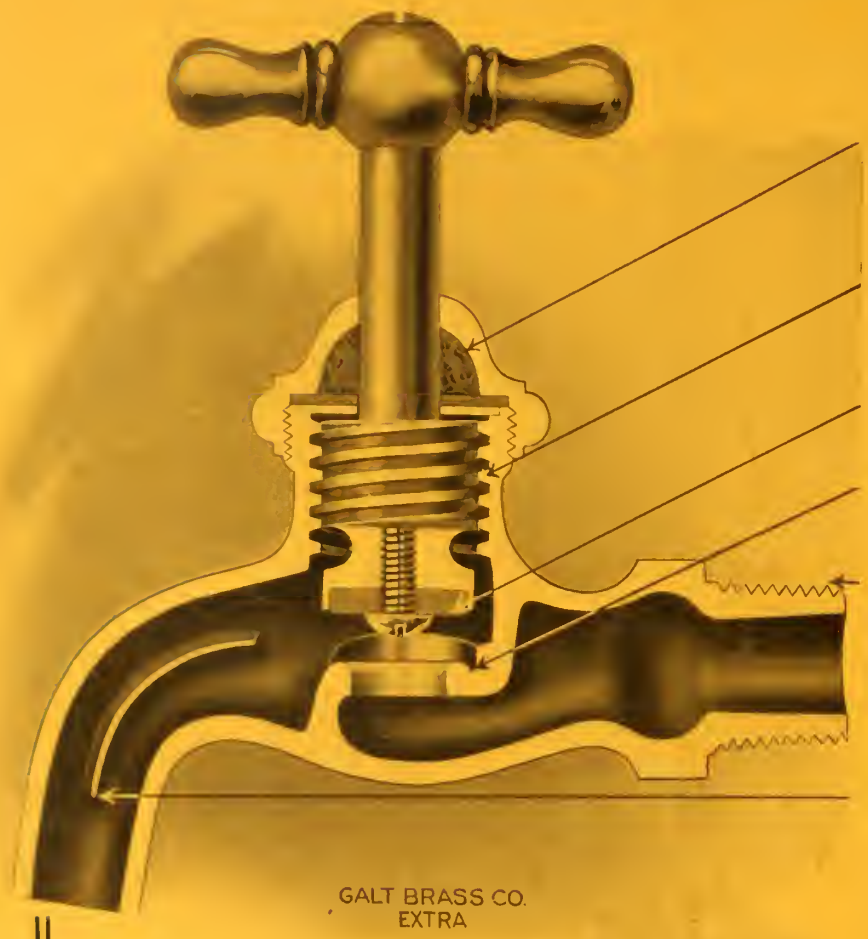

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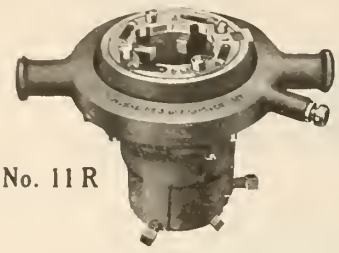

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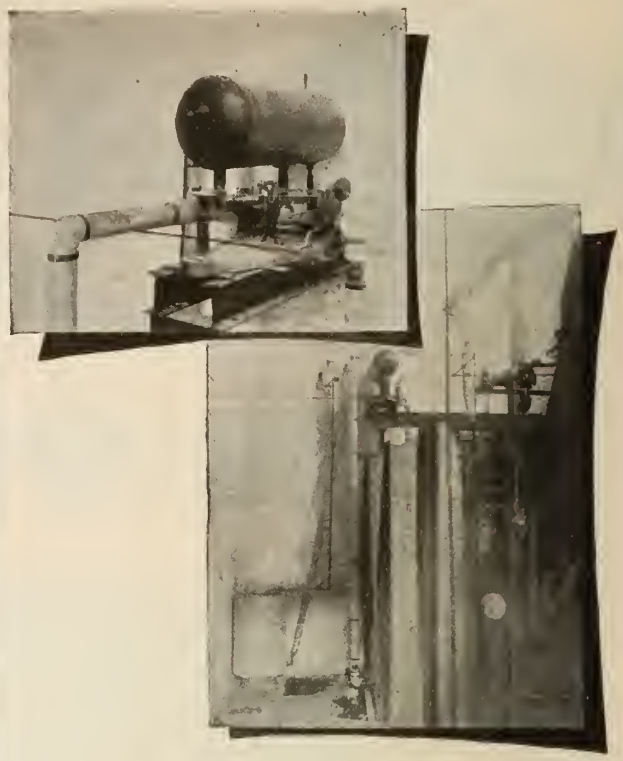

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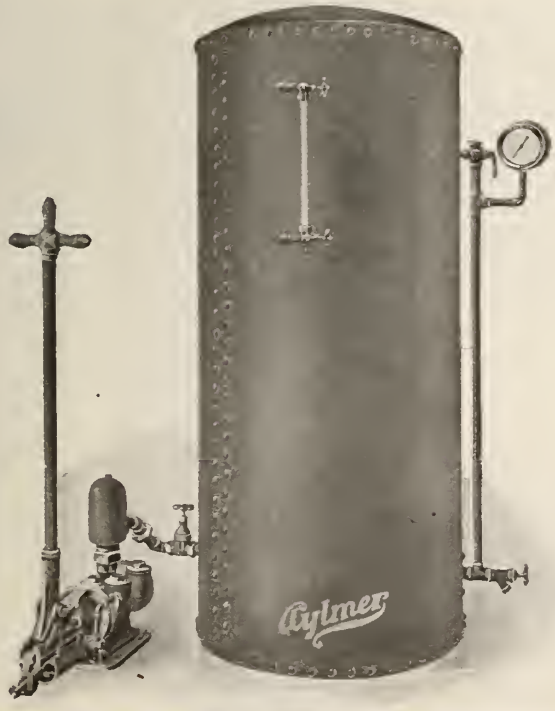

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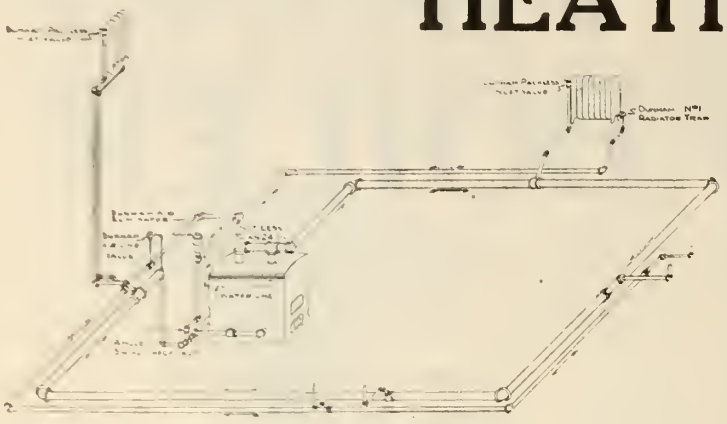

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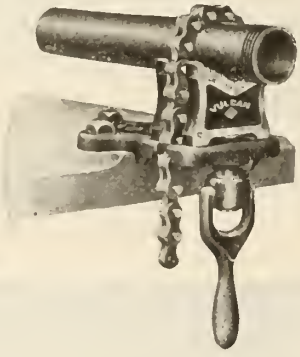

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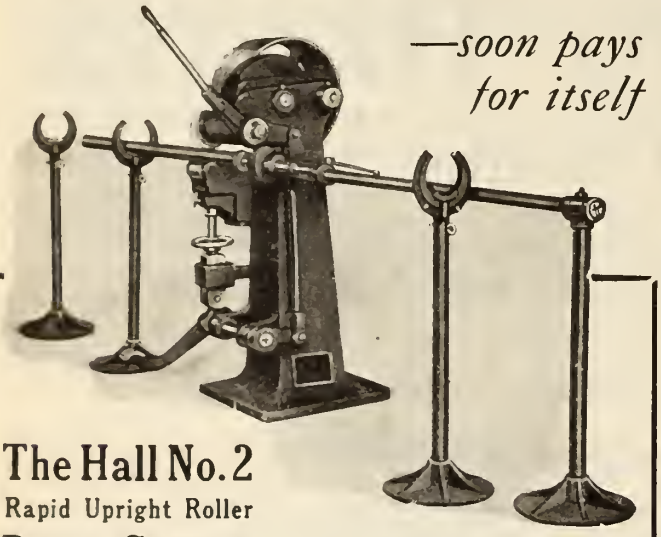

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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, NOVEMBER 1, 1915 No. 21

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They'll do better work with a new file—in less than half the time. And the saving goes into your pocket.

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THE SANITARY ENGINEER

VOL. IX. NOVEMBER 1, 1915 No. 21

Problems for Sanitary Engineers

An Address Delivered to the Winnipeg Branch of the Canadian Institute of Sanitary Engineers on Syphonage and Compression, Grease Traps, Explosions in Sewers, Frost Closures and Evolution of Soil Pipe Terminal in the Western Provinces.

By JAMES SMITH,

Cert. Incorp. San. Assoc., Scotland, Assoc. Royal San. Inst., Chief Plumbing Inspector, Winnipeg, Man.

I HAVE had some difficulty in determining what subject on plumbing I should discuss with you without being too technical, and finally decided, after pondering on the matter for a few days, not to give you a paper, but rather a talk on the problems we are meeting every day in designing, inspecting and testing plumbing. In presenting such a subject it is necessary to remember that Winnipeg, by reason of her geographical situation, is subjected to unique conditions, and those unique climatic conditions impose on us conditions which are unknown in other parts of the continent, and undreamt of in the milder and more temperate parts of the world. There are a number of plumbing problems, however, which are common to all climates, and one of them—which is, the determining of the relative sizes of soil, waste and vent pipes, so that syphonage and compression may be avoided—I would like to deal with for a short time, as at present it is engaging the attention of sanitary engineers throughout the country.

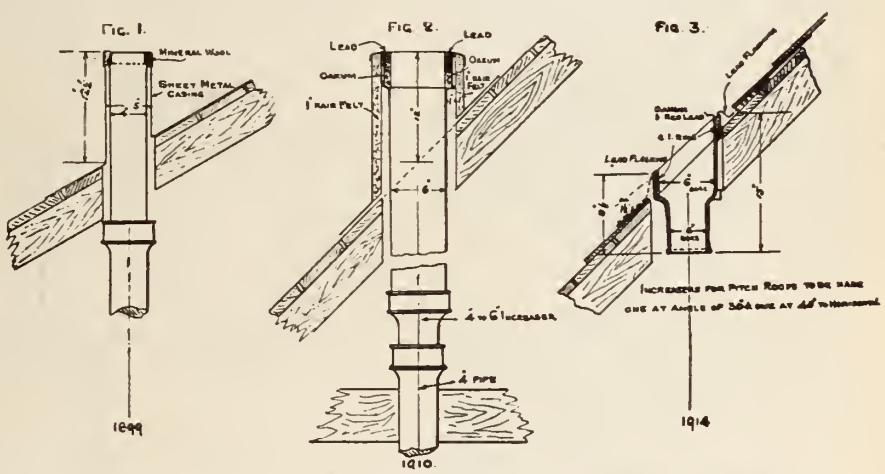
Syphonage and Compression

Hitherto the rule of thumb method of calculating the sizes of piping has obtained, but incident with the demand for higher buildings it was found that in buildings over eight storeys in height, and particularly when the general lavatories were placed as is commonly done on the upper floors, that the discharge from the fixtures on the top floors created syphonage and compression in the stacks, and either pulled the water out of the traps by syphonic action or blew the water out by compression, and tests carried on in the past four or five years clearly demonstrate that the problems of the soil waste and vent stack are still unsolved and are becoming more complicated with the increase in the height of buildings.

In Chicago a very interesting experiment was carried out about two years ago by Mr. T. J. Claffy, assistant Chief Sanitary Inspector. In an office building the main toilet rooms were on the 18th floor, as shown on this sketch, and on this floor over 40 water closets and six basins were connected to the 6-in. stack, and each fixture was separately vented, the vents being connected on each floor to the 3-in. main vent stack. On the 17th floor there was a water closet, lavatory, bathtub and shower bath, and below this on each floor to the 4th floor a lavatory was connected. On the 4th floor four water closets, two lavatories and a slop sink were connected, all separately vented as shown on sketch.

It was found that when the main toilet room on the top floor was in heaviest use, the trap seals on all floors below were either syphoned or blown out. A relief vent had been taken off the line near the ceiling and extended outside the building, terminating in a return bend close to the wall and sidewalk. Its only function seemed to be to deluge with sewage the passing public, and so was promptly closed.

A plumber who had been called in to stop the nuisance had extended an independent 4-in. line from basement ceiling to 4th floor, inserting a back water valve, as shown on sketch. This stopped the trouble on the 4th floor, but only served to increase it on the floors above. Finally a 4-in. relief vent was connected to main stack between the 3rd and 4th floors and extended separately through roof. It was noticed during the erection of this pipe that as its height increased its efficiency decreased, and although it solved the problem of loss of trap seal there was considerable agitation of the water in the traps when the pipe finally extended to the roof.



The evolution of the soil pipe terminal in the Western provinces.

As demonstrating the tremendous compression in a system such as this, when the discharge from the toilet room on the top floor approached the volume of a rush hour service the spray, carried by the compressed air wet the hand when placed over the open pipe at the 6th floor.

For several years now experiments have been conducted in the Illinois University under the auspices of the American Society of Sanitary Engineering, and

the deductions arrived at from these experiments are:

"1st. We must know the maximum volume of sewage flowing, the period of duration of the flow and its velocity.

"2nd. We must determine how much air will be moved under the above conditions and the period of time required to move it.

"3rd. We must reduce the effect of the velocity and pressure head of this moving air so as not to endanger trap seals, and

"4th. Having the above information the designer must strive to reduce velocities and eliminate air."

"In most soil pipes there is so much air moved by the flushing of fixtures that the air rather than the water is the determining factor in proportioning the stack," and it is along these lines that further experiments are to be carried on both in the laboratory and in field work till a practical solution of the difficulty based on scientific data is arrived at.

These troubles have usually been avoided in the past by making the pipes big enough and venting them liberally, but the result is that from the standpoint of the sewage discharged they are absurdly large.

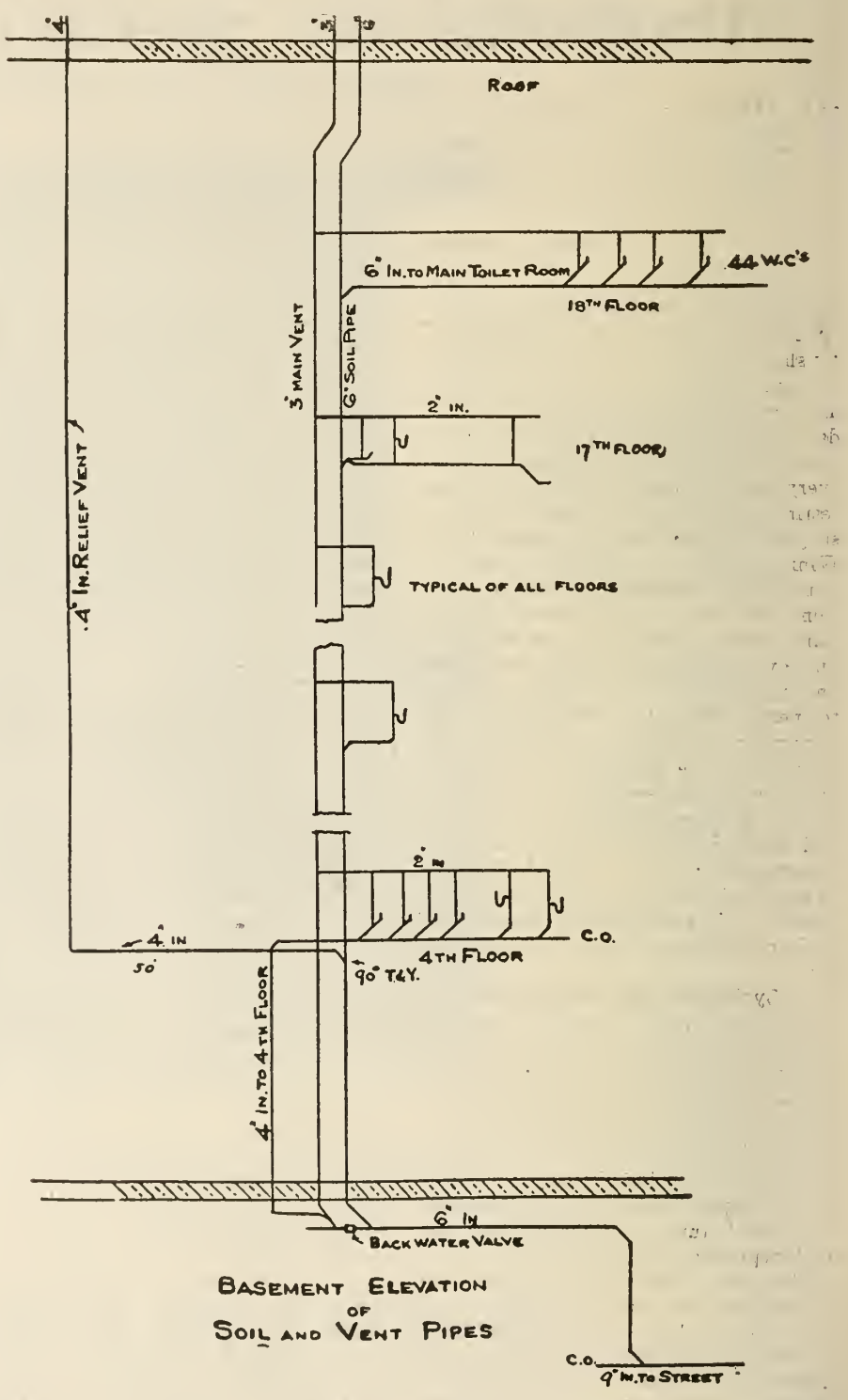
Fortunately and perhaps more on account of good luck than good guidance, we have not had a great deal of trouble from this cause in Winnipeg. The only experience we have had was where an ejector discharge was connected to the same drain as the other fixtures, and when the ejector was discharged it blew out several fixture traps. On investigation we found the ejector working under 60 lbs. pressure (an abnormal pressure), whereas it only required 15 lbs. to work efficiently, after adjusting the ejector there was no further trouble.

Grease Trap

Grease traps are an abomination under any circumstances, and whether they are a necessary evil is beginning to be debated in sanitary engineering circles. They are certainly a contradiction of one of the principles of sanitary plumbing, they are not self-cleansing. It is generally admitted that a grease trap to be efficient should have a capacity twice as large as the amount of water discharged through them at one time. Grease traps under some of our large hotel kitchen sinks or dish washers fulfilling that condition would be nothing more or less than cesspools.

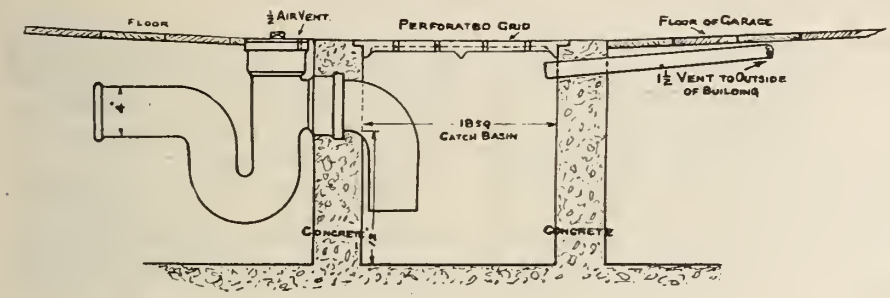
In more temperate climates the grease trap in most cases is placed outside and built into the ground with brick or concrete, being out of sight and for the most part out of mind it may be less objectionable till it is opened up to be cleaned out, and that is only done usually under compulsion.

More recently the water cooled type of grease trap has been introduced and is now used very largely, but except that it is a very costly fitting no marked improvement has been noted, and the best that can be said is that under certain favorable circumstances this type of grease trap may be less unsatisfactory than the old type. There is, however, to my mind, a serious objection to this type of grease trap, as it violates in my opinion one of the basic rules of sanitary engineering, and that is that no direct connection nor the possibility of such should be allowed between water supply pipes and waste pipes—or stated in clearer terms—there should be no arrangement of piping which would under any circumstances allow the water supply to be contaminated by sewage. This is exactly what might happen if a defect developed in the cast iron partition of the water cooled jacket. So long as the water was turned on nothing untoward could happen, but as soon as the water was turned off there is a possibility of sewage from the grease trap being drawn into the water pipes by syphonic action, and when the water is turned on again the sewage polluted water would be dis-



seminated through the building, with possibly very disastrous results.

Perhaps the greatest disadvantage in the use of grease traps is that they require a good deal of attention and cleaning out if they are to work with even a minimum of efficiency. The cleaning of a grease trap is a most objectionable exercise in the practice of practical sanitation, and this no doubt is the reason why so little attention is given to them. From my own experience I would venture to say that not 25 per cent. of the grease traps in use to-day are properly attended to and regularly cleaned out. This is usually done long after the trap is filled to its capacity with grease, and when the waste pipe beyond the trap is also filled to its capacity—in other words—blocked.



Catch basin for garage.

I have endeavored to point out the disadvantages of the grease trap in the foregoing, and as it has only one aim and object, viz., to keep the grease out of drains and sewers, and as I have shown that this is not accomplished to any great extent by its use, it becomes a debatable question whether the use of a grease trap is justified. There is certainly not an overwhelming amount of evidence in their favor, and I believe the next few years will see a reversion to some simple type of fitting which will accomplish the removal of grease from waste water without creating insanitary local conditions, and the grease trap as we know it now abolished.

Enquiry made by the Research Committee of the American Society of Sanitary Engineering brought out the information that few cities demand grease traps, many allow them to be installed, and a few will not tolerate them under any circumstances.

Explosions in Sewers.

Explosions in sewers are becoming of more frequent occurrence as the use of inflammable volatile liquids, such as gasoline, extends both for motive power and cleansing purposes, and an effective method of preventing such liquids entering the sewer is still a matter for speculation.

There is no doubt as to the seriousness of the result of gasoline finding its way into the sewers, as explosions have occurred in the sewers of several cities throughout the continent in the past few years, causing a very great deal of damage to property and in one instance the loss of life. It is very evident that gasoline is being discharged into sewers from garages and dry-cleaning establishments, as it is not uncommon when entering a sewer or passing a manhole to detect the odor of gasoline, and several explosions have occurred in the Winnipeg sewers, fortunately with comparatively little damage.

There are a number of devices manufactured to prevent the ingress of gasoline into sewers in the form of floor drains for garages, etc., and we have used the device illustrated in several places with success, but to make the remedy effective it would be necessary to have all floor drains in garages and other places where gasoline is used treated in similar manner, and we hope to get legislation to this end after further inquiry and investigation.

Frost Closure.

Frost closure of terminals of soil and waste pipes is probably the hardest problem we have to deal with in this climate, and we have spent much time and energy in the past five years on this subject.

From the ordinary 4-in. pipe cased with galvanized iron, as shown in Fig. 1, we passed to the type shown in Fig. No. 2, commonly known as the "garbage can," which came into use about four years ago. Although this was an improvement on the old method it was only partially successful, and a year ago a new type of terminal was devised, Fig. 3, which has met with more success. The present winter has not been very severe, and so a very reliable test has not been made for ice formation, but in other respects the test has been unusually severe by reason of the large amount of snow that has fallen. To date we have not found a terminal of this description entirely closed, although we have circularized the trade asking to be informed at once if any such terminal was found closed with frost or snow, and in addition the department have made numerous inspections of terminals constructed in this manner throughout the winter.

The by-law controlling this point now reads:

"All terminals of soil, waste and ventilating pipes of 4 inches in diameter or less shall be increased 2 inches in diameter before passing through the roof of the premises by means of an increaser with top end conforming as near as possible to pitch of roof and projecting to the outer air not less than one inch and not more than three inches at any point above the roof, and be made weather proof by means of a lead flashing. All such lead used for this purpose shall be in weight at least 5 lbs. per square foot, and shall be worked over and into the hub of increaser with not less than five inches of cover on the roof on either side of the pipe terminal, and it shall be finished with a cast or wrought iron ring properly caulked with lead or oakum and red-lead into the hub thereof."

HOUSING OF THE INDUSTRIAL WORKER

The following article appeared in the last issue of the quarterly bulletin entitled Conservation of Life.

It will be seen that the writer of the article realizes that the sanitary engineer should be first consulted when the erection of houses are contemplated. The Sanitary Engineer maintains and has done so for some time that plans of all dwellings should first be put before the health department rather than the architect department. Thousands of houses are built every year which could be heated, ventilated, and have the necessary sanitary equipment installed at much less cost if the sanitary and heating engineers were first taken into the confidence of those constructing houses.

The important question of housing industrial workers can only be satisfactorily solved, when some one, or perferably some government, demonstrates the possibility of erecting houses, which, conforming to the requirements of the sanitary engineer, can be rented for amounts which are not out of proportion to the occupiers' incomes, and yet yield the investor an equitable return for his investment and risk. When considering the amount of rent an occupier may be able to pay, it is necessary also to take account of certain expenditure indirectly connected with rent, although not rent; —such as the amounts that have to be expended in fuel to heat the house, the cost of water, the amount of tenant taxes, of fire insurance and of repairs, other than the repairs undertaken by the landlord.

A badly constructed house, at an apparently low rental, may cost more than a well constructed house at a far higher rental. The extra expenditure, under one or more of the items mentioned, may

(Continued on page 28.)

Smoke Abatement a Sanitary Measure

Ottawa Local Council of Women Taking Interest in the Smoke Nuisance—Just Such Stand as is Being Taken Will Assist Considerably — Sanitary Engineers Should Co-operate From the Mechanical Standpoint —Latest Figures as Result of Recent Tests

Contributed by the Health Committee of the Ottawa Local Council of Women.

THE close connection that exists between a pure atmosphere and the health of the community is being recognized by the public authorities of many of the larger towns and cities of this and other countries, says a London journal, "and a distinct revival of interest in the subject of smoke abatement is to be noted on the part of municipal health committees and of the general public. Classes for stokers and engineers have been started in many cities, and it is hoped in time to create a standard of merit and efficiency and to issue certificates to those who have gone through the regular course of instruction.

"The provision of a properly trained body of intelligent and skilled stokers, in place of the horde of unskilled shovellers, is essential to any solution of the black smoke problem. Technical education authorities of many large towns and cities are now including classes for stokers and boiler engineers in their curriculum. So far Glasgow has been the most successful in its conduct of these classes, which are carried on in the winter months at several different centres. In the United States, the chief event of the last year in connection with the progress of the smoke abatement movement, was the publication of five bulletins by the commission of university graduates and experts, who are investigating the problem in Pittsburg. The head of the Mellon Institute of Industrial Research has been provided with ample funds for this inquiry, and twenty-five specialists have been engaged in the work for over two years."

In Smoky Pittsburg

The following is taken from a recent article in the Pittsburg Gazette-Times: "J. W. Henderson, chief of the Bureau of Smoke Regulation, explains how Pittsburg can be smokeless and prosperous too." Mr. Henderson is quoted as follows: "From the beginning of our connection with the city's work for smoke abatement, March, 1914, lots of uninformed persons came forward with advice as to our efforts hurting Pittsburg. They almost convinced us for a time that 'Prosperity promotes Pittsburg' or rather, as they claimed, prosperity depends upon smoke, that the slogan of our city should be 'Smoke promotes Pittsburg.' Fortunately, investigations and experiments prove that 'Pittsburg promotes Progress' in smoke abatement as well as in many other ways. These meetings and the co-operative effort being put forth—and, what is more to the point, the gratifying results to the business interests engaged in this work, as well as the people—constitute evidence sufficient to stimulate to action those who have been holding back thus far in this movement of great economic and social benefit: "The United States Weather Bureau furnishes data that are interesting and instructive on this subject:

"Total number of days smoke recorded: 1912, 246; 1913, 214; 1914, 156.

"Total number of days smoke recorded in first six months of 1912, 123; 1913, 105; 1914, 76; 1915, 67.

A Company's Effort

"Perhaps the greatest accomplishment in smoke abatement in Pittsburg is that mentioned in the report of the Crucible Steel Company of America. The president of this corporation writes as follows: "To do away with the smoke evil, to save labor and to make fuel consumption the more effective, we have scrapped an old plant of fifty-five boilers, and have replaced them with eight 600 horse-power units having double steam pressure with mechanical stokers. These eight boilers cost with boiler house, coal and ash-handling apparatus, including every mechanism known in produce to up-to-date plant, but $132,000.

"This new installation is saving $1,500 a month in pay roll, and $3,000 per month in coal, equal to $60,000 per annum, or 6 per cent. on $1,000,000. In addition, it has increased the capacity of the whole mill through a greater steam supply. Along with this saving of $60,000 must be reckoned a further saving to the people of the vicinity estimated at twice this amount. A year ago less than 1 per cent. of the locomotives in Pittsburg were complying with the law, now more than 99 per cent. are complying. The people of Pittsburg suffer an annual loss of $10,000,000 through smoke. The loss to Chicago is estimated at $17,600,000 a year.

"The cost to Cleveland because of its smoking factories is estimated at $6,000,000 a year, while the entire bill paid annually by the people of the United States on account of smoking factory chimneys is reckoned at $500,000,000."

Viewed from any angle whatsoever, the pollution of our atmosphere with smoke places a heavy burden upon us. It greatly increases the death rate. It adds to the number of the sickly. It lowers our efficiency. It takes large sums of money out of our pockets, why permit it?

EDITOR'S NOTE

In the September issue of The Sanitary Engineer it was pointed out that the smokeless boiler should be more universal than is the case to-day.

This article calls attention to the fact that firemen and stokers should be skilled men, etc.; and no doubt to some extent this is the case; but when a man goes to the ordinary housewife for a position as fireman, or when an institution, whether public or private, requires a fireman, the man who will take the job at the lowest figure is given the position, and very few questions are asked as to qualifications.

The writer has known of dozens of instances where incompetent men have been given the mere pittance of $4 a month to fire a furnace, and in actual fact, in spite of their incompetency, have no doubt kept a building warm, but at what cost? Sometimes as much as one-third more fuel has been burned than was necessary.

It might be argued that labor is cheaper than fuel in many cases; but that is not the question. It might also be said that house furnaces, because of hard coal being used, do not emit black smoke in very great volumes.

That may be true, and no doubt it is to a certain extent, but a great deal of unconsumed coal gas is emitted into the atmosphere along with smoke, and of the two evils the smoke would be the lesser.

Then, again, no matter whether labor is proved to be cheaper than fuel, no one should be allowed to wantonly pollute the atmosphere we breathe any more than the water we drink.

No doubt if sanitary and heating engineers would take this problem seriously and co-operate with such local organizations as their local councils of women, much good would be the outcome. And without question, the smokeless boiler, too, will do its part by saving fuel and preventing the pollution of the atmosphere we breathe.—Editor.

Useful Notes for Sanitary Engineers

Notes on Water Supply, Describing the Practical Theory of the Hydraulic Head of Water, Numerous Tables, Formulae, etc., All of Which Will be Found Invaluable to the Average Sanitary and Heating Engineer.

By R. O. Wynne-Roberts, Toronto

IN these collection of notes, those relating to water supply only will be dealt with. There are plenty of similar notes connected with sewerage work, ventilation, gas supply, etc., but those will be reserved for other occasions.

Every effort has been taken to explain these notes in simple language, so that the many may understand them. If there are any points which are not made clear, if the writer is informed of them, he will go further into the matter.

Circular Inch

Those who are not "quick at figures" often find it troublesome to calculate capacities of, discharges through, and velocities of flow in pipes and other cylindrical vessels. The following table and methods may assist such as these. In the first place, a circular inch is one inch in diameter and one inch deep (see Fig. A). A cubic inch is one inch wide, long and deep (see Fig. B).

The following table will set out the value of one circular inch in its relation to other measurements:

Table I.

Circular Inch	Cubic Inch	Cubic Foot	Pound	Imp. Gal.	U.S. Gal.
1.0	0.7854	0.000454	0.0283	0.00283	0.003396
1.273	1.0	0.000578	0.036	0.0036	0.00432
2200.0	1728.0	1.0	62.5	6.25	7.48
35.33	27.73	0.016	1.0	0.10	0.12
353.33	277.3	0.16	10.0	1.0	1.20
294.12	231.0	0.1337	8.34	0.834	1.

It will be seen that one circular inch equals 0.00283 Imp. gallon, or one Imp. gallon equals 353.33 circular inches. One cubci foot contains 1,728 cubic inches or 2,200 circular inches.

Assuming the knowledge of decimals, the application of the table is as simple as arithmetic can be made to be. The person who wants to use the table must think a little what he desires to know. A long list of directions will probably confuse more than explain the method. So a few examples will be worked out. In every case the diameter must be multiplied by itself—that is, squared, and feet must be reduced to inches.

(1) A tank measures 15 inches diameter and 40 inches deep, what quantity of water will it contain?

15 ins. x 15 ins. x 40 ins equal 9,000 circular inches.

If the answer is to be in Imperial gallons, multiply 9,000 by 0.00283, and it is 25.47 Imperial gallons.

If in U.S. gallons, multiply 9,000 by 0.003396 and it is 30.564 U. S. gallons.

If in weight multiply 9,000 by 0.0283 and it is 254.7 pounds.

If in cubic feet multiply by 0.000454 and it is 4.086 cub. ft.

(2) A pipe is 4 inches in diameter 10 feet long what quantity of water will it contain?

This is the same as the last example with a slight variation to illustrate use of the table.

Four ins x 4 ins. x 10 ft. x 12 ins. equals 1920 circular inches. To find number of pounds multiply 1,920 by 0.0283 equals 54.336 pounds. To find number of Imp. gallons multiply 1,920 by 0.00283 equals 5.4336 gallons. To find number of cubic ft. multiply 1,920 by 0.000454 equals 0.8716 cubic feet.

(3) Suppose water is flowing through a 2-inch pipe at a velocity of 5 ft. per second, what quantity will be discharged in one minute?

Two in. x 2 in. x 5 ft. x 12 in. x 60 sec. equals 14,400 circular in. For. U.S. gal. multiply by 0.003396 equals 48.90 U.S. gals. say 49. For Imp. gal. multiply by 0.00283 equals 40.75 imp. gals 40¾. For cubic feet multiply by 0.000454 equals 0.654 cubic feet, or two-thirds.

(4) If 500 U.S. gallons of water pass through a 6-inch pipe in one minute, what is the velocity of flow?

In the first place reduce the gallons to circular inches. One U.S. gal. according to the table equals 294.12 cir. inches.

500 U.S. gallons will equal 147,060 circular inches.

Six-inch pipe one foot long will be equal to 6 x 6 x 12 or 432 cir. inches.

To find out the velocity 147,060 must be divided by 432 and the answer is 340.4 feet, say 340½ cubic feet.

(5) A single acting triplex pump with an 8-inch plunger 10 inches stroke and working at 40 revolutions or strokes per minute. What will it discharge?

There are 3 cylinders each 8 inches in diameter, so 3 cyl. x 8 ins. x 8 ins. x 10 ins. x 40 r.p.m. equals 76,800 cir. inches.

For Imperial gallons multiply by 0.00283 equals 217.34 or 217 1/3 Imp. gallons.

For U.S. gal. multiply by 0.003396 equals 260.81 or 260 4/5 U.S. gallons.

Water Pipes

Sanitary engineers are called upon to lay pipes to deliver a certain maximum quantity of water, and it is often puzzling to know how to calculate the diameter. The following formula and table is as simple as any other.

Let C represent a constant, varying according to sizes of pipes,

A represent the number of Imperial gallons of water to be delivered in one minute,

L represent the length of water pipe in feet,

H represent the available head of pressure in feet,

$$\text{Then } C = \frac{G^2 \times L}{H}.$$

Find the constant in the table which is the next larger and opposite it will be found the diameter required.

Table II.

Water Pipes	
Constant	Diameter in Inches
5	½
18	⅝
48	¾
250	1
370	1⅛
810	1¼
2260	1½
5020	1¾
10200	2
20800	2¼
34600	2½
60000	2¾
92000	3
140000	3¼
208000	3½
296000	3¾
420000	4

Example 1. The pressure in the street mains will force water up to a height of say 150 feet above the street. The highest part of the building to be supplied is say 100 feet high above the same street. The length of pipe required to connect the two points is say 200 feet. What size pipe is required to deliver 100 gals. per minute?

$$C = \frac{G^2 \times L}{H} \qquad G = 100; \qquad L = 200; \qquad H = 50$$

The pressure available to force the water in this case is the difference between 150 feet and 100 feet, i.e., 50 feet.

$$C = \frac{100 \times 100 \times 200}{50} = 40{,}000$$

The nearest figure above 40,000 in the column for C is 60,000, and opposite is $2\frac{3}{4}$ inches, which is the diameter required. In practice no doubt a 3-inch pipe would be laid.

Example 2. Water in tank on hillside stands 60 feet above top of a house 500 feet away. Twenty gallons per minute are required, what size pipe is required?

Here G = 20 H = 60; L = 500

$$C = \frac{20 \times 20 \times 500}{60} = 3{,}333$$

The nearest figure above 3,333 is 5,020, opposite which is the diameter required, viz., $1\frac{3}{4}$ inches.

Example 3. Suppose a 2-inch pipe was laid to deliver water from a main to a country house. The pressure in the main is say 100 feet, that is, the water would rise vertically in a pipe to that height. The roof of the house is 80 feet above the water main and the distance between the water main and the house is 600 feet. What quantity of water will it deliver per minute?

$$\text{The formula now is } \sqrt{\frac{E \times H}{L}} = G$$

The constant opposite 2 in. is 10,200.

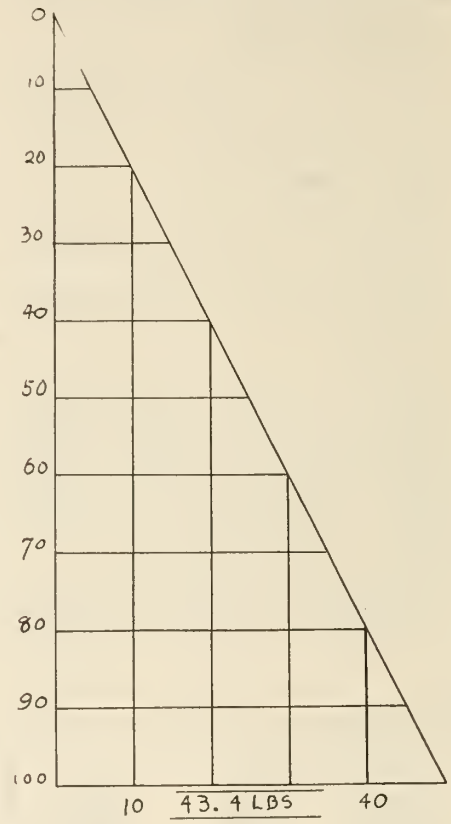
H = 20 ft. L = 600 ft.

$$\text{so } \sqrt{\frac{10.200 \times 20}{600}} = 18.4 \text{ gals. or say } 18\tfrac{1}{2} \text{ gallons per minute.}$$

It will be noticed that nothing has been allowed for bends, tees, etc., which must be considered in another article.

Measurement of Small Stream of Water

When the quantity of water to be measured from a spring is small and its approximate measurement is wanted the writer has found the following way to answer.



Dig a hole 1½ times the depth of a bucket and twice as wide, in the stream bed. Use the earth to dam up the stream making the embankment as water tight as possible. Drive a peg in the stream bed about two feet away from the hole and fix a nail on the top of peg. The water must be able to fill up higher than the nail.

When everything is ready and the water has risen to the level of the nail top take out two or three bucketfuls of water and throw them away and with a watch note the number of minutes or seconds it takes for the water to refill the hole to the top of the nail. Try this carefully two or three times.

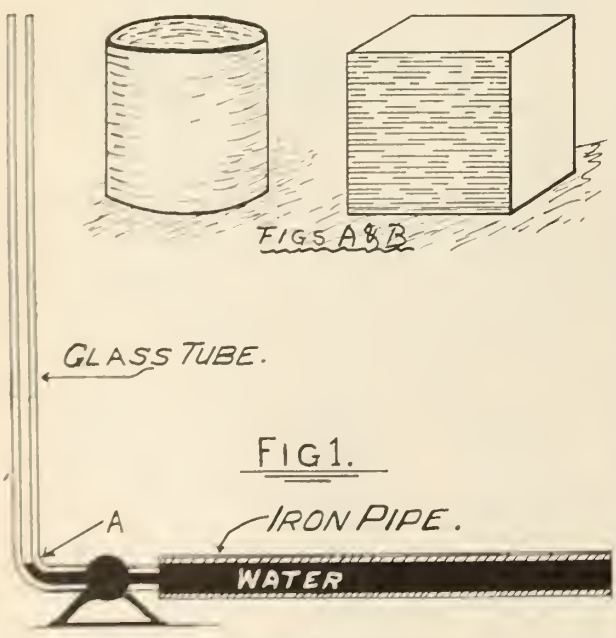
Suppose the bucket held 2½ gallons and that on an average it took 4 minutes to refill three bucketfuls. The following simple calculation gives the information desired:

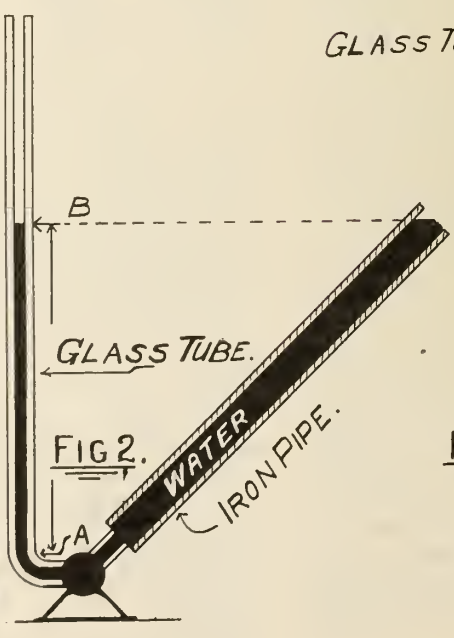
3 × 2½ = 7½ gallons in 4 min. or 1.9 gals. per min., say 2 gals.

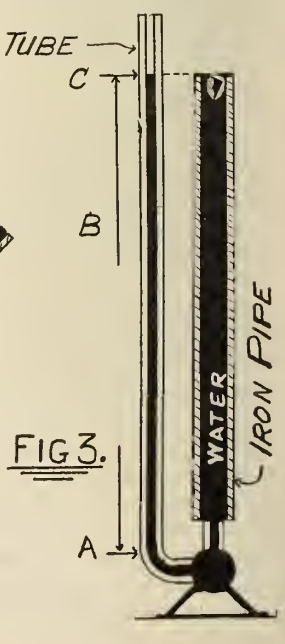
Water Pressure

If a pipe filled with water is laid on the ground as illustrated in Fig. 1, the water is pressed on the lower surface and not on the upper and would rise in the glass tube only as high as A. If one end of the pipe is raised up the pressure will press increasingly from the top to the lower end and will rise up the glass tube as high as B in Fig. 2. If the pipe is raised vertically as shown in Fig. 3, the water will increase to press from top downwards and will rise up the glass tube to C.

(Continued on page 31.)







Sanitary Installations for Farm and Dairy

A Description of Farm and Dairy Installations Which Will Prove of Interest and Mean Business to Sanitary and Heating Engineers—Country and Farm Homes Can be Equipped for Less Actual Cost Than Those in the City

First Article of the Series.

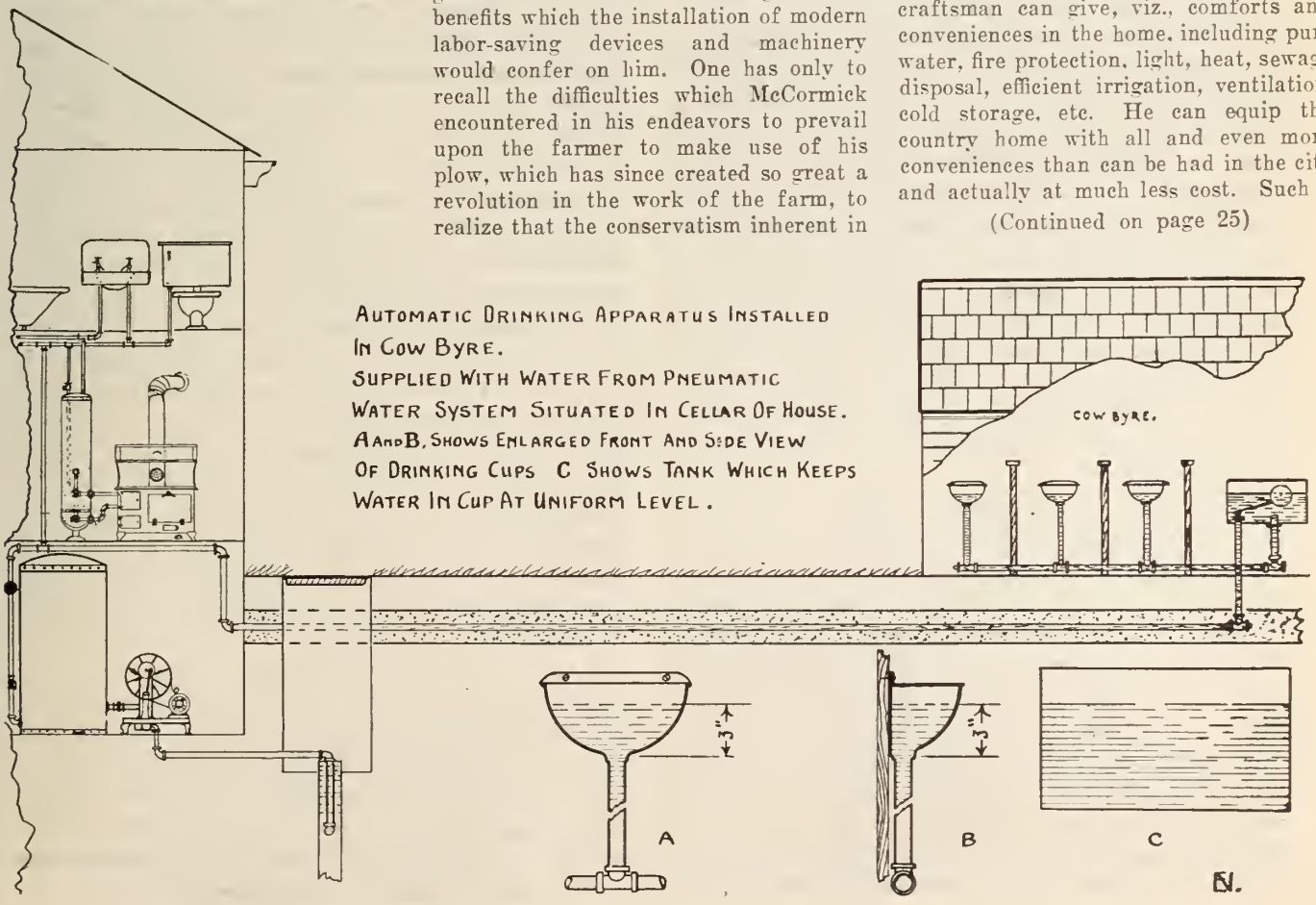
IN Oct. 15 issue of the "Sanitary Engineer" there appeared an article entitled, "The Widening of the Field" in which were brought to our readers' notice the unprecedented opportunities for the sanitary and heating engineer if he would only strike out from the beaten paths of business in the city and, by extending his energies further afield in the direction of the country and farm homes, would make it his business to render to the rural population of the country that service toward the betterment of their home-life conditions which hitherto he has devoted exclusively to the amelioration of the lot of the dweller in urban districts.

Of late years probably one of the most lucrative businesses in which a man could engage has been that of the farmer and dairyman. The products of the farm and of the dairy comprise the first necessaries of life, not only of human life, but of animal life as well. There can be little fluctuation in the demand for them and, in fact, of late the demand has tended to exceed the supply. War or no war, bad times or good, the products of the farm or dairy will always find a ready sale. This has been more especially the case during the past year with the increased overseas requirements which have had to be met in addition to the local domestic demand. It may therefore be said, without fear of contradiction by even the most conservative-minded, that the profits of the farmer and dairyman are, especially at the present time, greater, more legitimate, and steadier than those to be obtained in any other line of business. This being so is there not grand scope in this direction for new business for the sanitary engineer who will take the trouble to go after it?

Having regard to these conditions in the affairs of the farmer and dairyman, there is one circumstance that cannot fail to strike the observant onlooker of rural conditions and that is that the agriculturist, as a general rule, has altogether failed to take advantage of the benefits which the installation of modern labor-saving devices and machinery would confer on him. One has only to recall the difficulties which McCormick encountered in his endeavors to prevail upon the farmer to make use of his plow, which has since created so great a revolution in the work of the farm, to realize that the conservatism inherent in the average agriculturist would render it by no means an easy task to induce him to avail himself of the advantages offered by the scientific inventions and improvements of modern sanitary engineering, even had the modern sanitary engineer devoted far more of his time and energy to this purpose than it has occurred to him to do.

At the period moreover to which we refer, viz., that of the introduction of the plow, the old-time plumber had little to offer in the way of improving or modernizing the farm home. All this, however, is now changed. The plow was simply a case of applied mechanics, whereas modern sanitary engineering has called into play not only applied mechanics but also science and even art. Far be it from us to depreciate in the slightest degree the work done by McCormick. He undoubtedly worked wonders; but the sanitary and heating engineer can do more. He can actually add years to the life of the farmer, his help, and his family. He can give them what no other craftsman can give, viz., comforts and conveniences in the home, including pure water, fire protection, light, heat, sewage disposal, efficient irrigation, ventilation, cold storage, etc. He can equip the country home with all and even more conveniences than can be had in the city and actually at much less cost. Such a

(Continued on page 25)



AUTOMATIC DRINKING APPARATUS INSTALLED IN COW BYRE. SUPPLIED WITH WATER FROM PNEUMATIC WATER SYSTEM SITUATED IN CELLAR OF HOUSE. A AND B, SHOWS ENLARGED FRONT AND SIDE VIEW OF DRINKING CUPS C SHOWS TANK WHICH KEEPS WATER IN CUP AT UNIFORM LEVEL.

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NOVEMBER 1, 1915

THRIFT AND THRIFT

JUST as there are men and women who have various ways of expressing themselves, so are there several ways in which a person or persons may be regarded as thrifty. One person will declare that a thrifty person would be one who puts a certain sum of his or her earnings aside for a "rainy day." Others would be defined as being thrifty who were always busily occupied from day to day in some situation or other, and many other ways are there by which a person may be termed thrifty.

But how many are there who have stopped to really consider what true thrift is?

We venture to say, very few. For instance, our own country is to some extent peopled with thrifty folk, yet it can easily be proven that at least 35 per cent. of this country's resources are being unknowingly wasted, not only in our cities, but in country districts too. Anyone traveling through the country recently, might have seen apples by the ton lying about wasted; peaches by the ton were, we are told, left lying on the ground because they were so very plentiful this year. Straw is buried by the ton in our Western provinces. Along the railway, there can be seen thousands of old ties either rotting or being burned up in piles. If the country folk were even given these ties for domestic fuel, they would not be wasted.

But there is still a much greater waste taking place in ourselves. How do we spend our time? Do we endeavor to make every moment count for something? or are we blindly plodding along in the same old rut? Are we improving ourselves by acquiring better ways of doing things? Are we becoming more efficient? There are only two sources of wealth in this world and these are raw material and labor. We have shown how we are wasting raw material, which is a sin, and no doubt it would be easy to prove that we are, each one of us, wasting our labor power. As regards lumber or other raw material which can be grown, it is replenished by Mother Earth and Father Time. But our time, our labor, if not made the most of, is forever lost and cannot be replenished. A man in our trade is apt to say: "Well, I reckon if I wipe 12 joints a day, providing they are straight work, I've done a day's work." Another will think, if he has fitted up a certain number of radiators, he has done a good day's work and so on; and in many cases both are right. But, suppose these same two men were able, by working another hour or two a week, to increase their ability so as to do more work in a day! What then? That's the point. If we desire to be thrifty we must increase our own earning power. We may not be paid for this increased service in mere dollars and cents, but the time cannot be far off when such increased earning power will receive its due reward. Further, if we do not exert every effort to produce all we can as industrial workers, we are just so far doing ourselves an injury as well as robbing our country of so much of its earning power. No man liveth unto himself alone, and no man can get away from the fact that if he is not as efficient in his earning power as he might be, he is so far a direct loss to himself, as well as to his country. Now, how does this apply to sanitary and heating engineers? It affects us just in this way: we have, by hard struggles, costly to ourselves, plodded on and accomplished great things. We have installed millions of square feet of radiation. Why? and how? By pure rote. At least 60 per cent. of our installations have been constructed, "just because" as the saying is. And at what cost to ourselves? Now, to reduce this cost, and at the same time increase our efficiency, we have but one course to pursue, and that is to devote a little more time to technical education. Then we shall know more of what we are really doing, and why. The winter nights will soon be upon us which will give us time to study, and the cost is trivial in comparison with the returns derived from such study. Then, when better times come, when this terrible war is at an end, we shall realize that we have become in reality a more thrifty class of men.

OPTIMISTIC OUTLOOK

THE whole trade is beginning to experience better times, not only due to slightly increased volume of business, but also to the fact that a better class of business seems to be developing. Several manufacturers recently have stated in the course of conversation that while they had been able to take care of the ordinary demand for staple lines the demand for special lines of higher grade goods was decidedly on the increase. One firm, in particular, stated that they were behind in filling orders for higher grade goods. This looks very promising. In another instance a sanitary and heating engineer declared that he had ceased to stock the poorer grade of brass goods; that he had, like many others, formerly been tempted by price instead of quality, and as an instance of loss resulting from such policy he pointed to a box full of brass goods which had been taken out after being in use only a very short time, and remarked that, the trouble they had experienced in that one job had actually cost them more than if they had put in high-grade brass goods in the first instance.

Now, this is a species of economy, the science of good buying. Those who buy low-grade goods are not only wasting their own time in installing them because of the short service such goods will render, but they are also assisting to waste the time of the men employed in making them. There is no practical thrift exercised by either the manufacturer, the sanitary engineer or his customer, when poor cheap goods are installed. Therefore that the outlook is improving is shown by the very fact that the demand for better goods is likely to be the rule rather than the exception, and such being the case, the results will be more profitable for every one concerned. There can be no doubt for the future if the trade as a whole becomes more efficient in buying, and if, when buying goods of whatever nature, will demand that quality and not price shall be the prevailing element. Quality is bound to give maximum service. The writer was once taken to task for being a little too painstaking with a certain job, and was told that the job was not expected to last an eternity, but only for a time, but if the job had been executed as desired by that particular boss, its life-time would have been so short that it would not have paid for the time spent on it. It is the same with a cheap line of goods, they are often too dear because of the time spent on them before they are ready for duty.

PRACTICAL SANITATION

WHILE, as every one of our readers will agree, the medical fraternity are a necessity to us all and are doing great work in keeping down disease and effecting important cures, they are very much in the dark when it comes to the simplest construction necessary, of a sanitary nature. An instance of this is seen in a case which came to our notice recently.

A well-known medical authority in a certain Canadian city called in a sanitary engineer to install a lavatory bowl in his laboratory and asked that a waste pipe be connected to the lavatory, to run down vertically to below the floor, then horizontally for about 25 feet, with a trap at the point where the waste pipe was to enter the drain.

When the sanitary engineer explained that the trap must be placed as near as possible to the fixture, and that it should be back-vented, the worthy doctor waxed wrath, and said that nothing but a few chemicals and clean water would be poured into the pipe, and averred that it was a hold-up, that it was not necessary to go to all that trouble to instal a lavatory in such an elaborate way. The job was not done, because this sanitary engineer stated that he had his reputation as well as his conscience at stake.

Soon after this sanitary engineer was called into another doctor's place and took out a trap from under a lavatory which was leaking as well as being plugged up. He took it over to the first named doctor with a view of proving to him that no fixture trip is so filthy as that of a lavatory, not even excepting the sink trap, but all to no avail.

Now, does not this case prove conclusively that not the public only but also the medical fraternity require educating more along the lines of sanitary engineering construction? We are sure they do.

While discussing this subject, it might not be out of place to mention a case where a city business man when told recently by the writer, that he could enjoy every single city convenience, without exception, in a country home, was amazed and declared that he would not live another year round in the city.

This man had heard that some kind of make-shift plumbing could be installed, but never felt that he could feel comfortable with make-shift plumbing in any home he lived in, as, having a family, he realized the necessity of having the very best plumbing and heating installed. It might be interesting to know what the trade in general is doing by way of educating the public along these lines. We firmly believe that if every sanitary and heating engineer will endeavor to make a call upon each and every one of his customers and take up the question of sanitary and heating installations for country homes, those who do own country homes will appreciate any information that may be given them, and at some future date will have all city conveniences installed in their country residences.

EDITORIAL BRIEF

DON'T BE tempted to do a job which is not in keeping with the best practice known. The work of the sanitary and heating engineer involves the health of the community.

Practical Course for Sheet Metal Workers

ARTICLE No. 24 OF SERIES

By CHARLES SEIVERS

IN article 22 we showed how the various patterns were to be developed, which would be necessary for the branches to be taken off a given main pipe.

Such branches are very often very necessary for air ducts, and in many cases such a branch will overcome the use of an elbow.

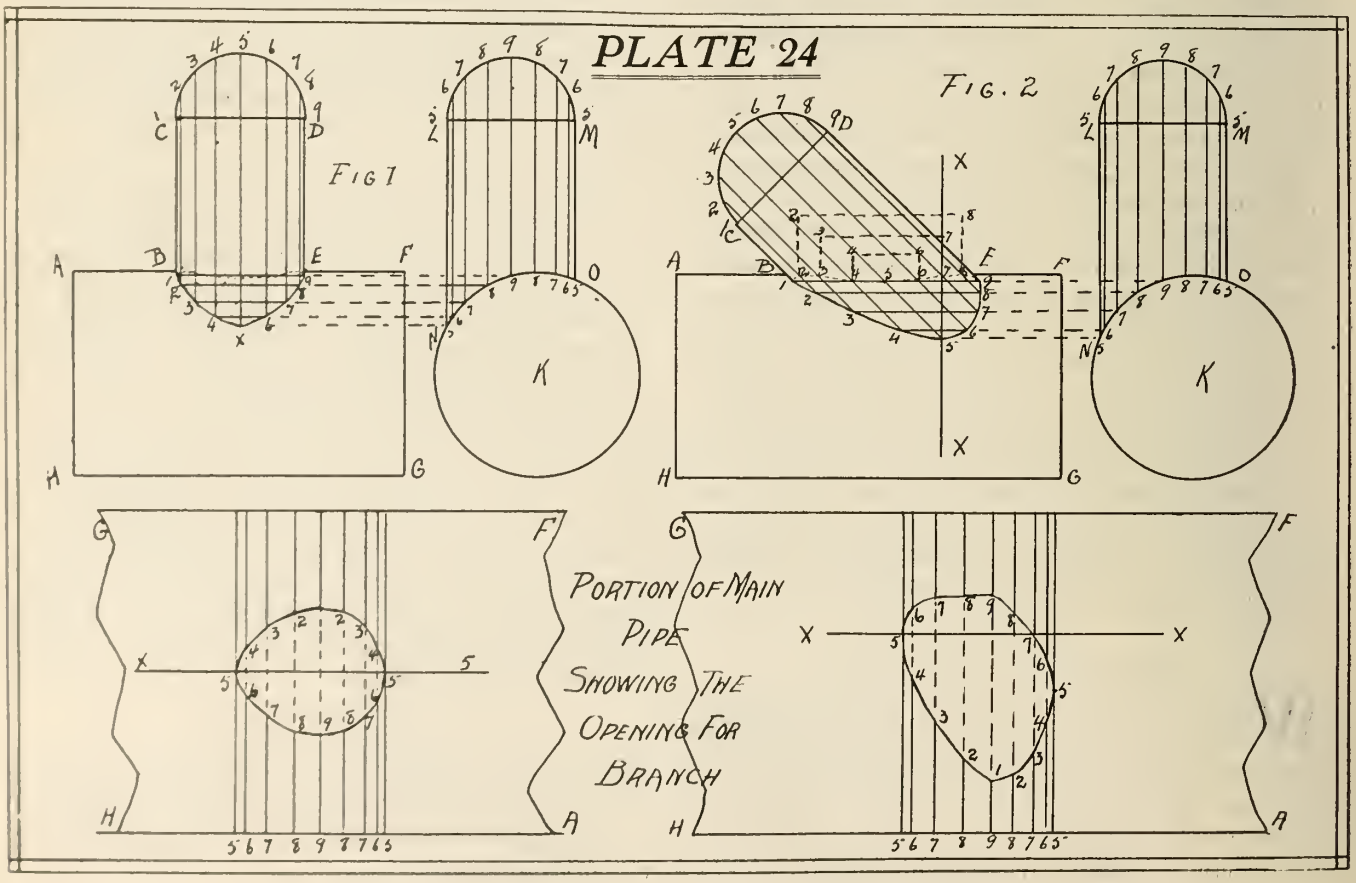
This article takes up the method of developing the pattern for the hole in the main pipe. Plate 22 and article appeared in our special spring number.

To develop this portion of Fig. 1, lay out portion of main pipe, as shown by G-F-H-A. On A-H set off the spaces between N and O on section at K, numbering them to correspond. From these points draw lines at right angles to H-A, joining them to G-F, these lines being the points on circumference where divisions from branch intersect. The next step is to mark off the width of branch on each line, using the line 5-X as a base line to work from. Measure the distance from 5-X to points 4 and 6 (in this case being a square branch, both sides are equal). Now, set off from a corresponding base line on pattern. Measure from 5-X to 3 and 7, 2 and 8, and 1 and 9, and set off in same manner from base line on pattern. A line drawn through points thus obtained will give outline of opening for branch.

In Fig. 2, lay out portion of pattern and set off divisions between N-O, as in Fig. 1. To mark off the distances between 1 and 9, 2-8, 3-7, 4 and 6 and point 5, we can work from line A-H, F-G, or a parallel line between them, as X-X, and use a corresponding line on pattern. (As in these figures the branch is not directly off the centre of main, it will be necessary in this case to measure the distances between these points, 1-9, 2-8, etc., on each side of centre line, 1-9), the side on elevation being shown by solid lines and the opposite side by dotted or broken lines (these are extended upwards to make clearer). A line drawn through the points thus obtained will give outline of opening for the branch.

PROVINCIAL WAR TAX.

Taxation of all the assessable land in Ontario at the rate of one mill on the dollar was the war measure proposed by Hon. T. W. McGarry, Provincial Treasurer, in his Budget in the Legislature this week. This on the basis of an assessment of $1,800,000,000 is calculated to raise a revenue of $1,800,000. The proposal is made only as a temporary tax, not to be continued after the war, but is to provide for such extra demands as may be made from time to time in order that Ontario may contribute its share towards meeting the burdens of the Empire at this time. Apart from this proposal, Mr. McGarry reviewed at some length the financial situation of the Province, claiming that the nominal deficit had been caused by extraordinary conditions, and had the estimates of last year been fulfilled the result would have been different. He submitted an estimate of the assets and liabilities of the Province, showing that over all charges there was a net surplus of $14,000,000.



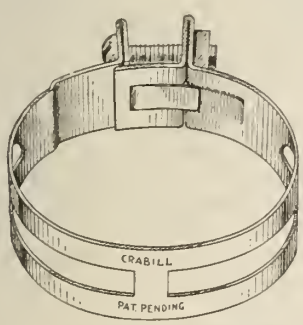
New Sanitary and Heating Goods

WASHERS OR DISCS FOR BIB TAPS

A suhstance suitahle for washers or discs for hih taps, which will withstand any sort of climate, and is especially impervious to heat, can reckon on finding a good market anywhere, and particularly in tropical and suh-tropical countries. Such a suhstance is "Valvene," put upon the market in the form of discs by the Commercial India Rubher Manufacturing and Supply Co., 585 Commercial Road, London, E. "Valvene" discs are manufactured from a preparation of ruhher, and are adaptahle to both hot and cold water fittings. They are soft and pliable, and it is, therefore, possible to make a really perfect joint with them without trouhle, and in this particular alone they are eminently superior to the ordinary type of tap-washer which, as everyone has experienced, is a source of constant trouhle and vexation. It is to he noted that every disc leaving the firm's premises is plainly marked with the word "Valvene."

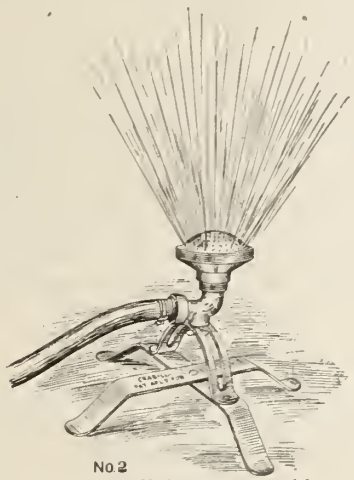
CRABILL HOSE CLAMP AND SPRINKLER

Chahill Hose Clamp Co., Battle Creek, Mich., offers to the Canadian trade the Crabill hose clamp, here illustrated. The



The Crabill Hose Clamp

makers claim that the construction of the clamp provides for additional cternglh at the tongue—the point where strength is needed most. The metal is emhossed to take care of the tongue. This, it is claimedw, gives a smooth inside circle that will not injure the hose. The clams are made in various sizes, in both hrass and steel. Special sizes can be made when needed. The company also offers the Crahill lawn sprinkler. The sprinkler has a round edge, steel base, which, it is claimed, cannot he tipped over or broken. The sprinkler head is made of heavy spun hrass, in two pieces, with a screwtop. By making a screw top with ruhber gasket, it is said the danger of leakage is eliminated, and the sprinkler can he taken apart and cleaned quickly. The spray from the sprinkler is very fine. The sprinkler is adjustahle for the purpose of sprinkling a square corner or a terrace, or directly upwards if desired. The makers

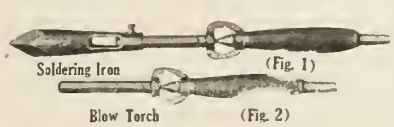


The Crabill Hose Sprinkler

claim that when adjusted as a fountain the sprayer will spray a 30-foot circle with from 40 to 50 pounds pressure.

SOLDERING IRON AND BLOW TORCH

The Up-to-Date Mfg. Co., Lytton Building, 14 East Jackson houlevard, Chicago, Ill., offers to the trade the "Autocrat" convertible soldering iron and hlow torch, which uses gas as fuel. The makers state that the tool is automatic and requires no pump attachment or furnace. The heat is applied directly to the inner hase of the soldering tip and does not come in contact with the working surface, thereby insuring a clean iron, long life and a saving in time. The soldering iron remains hot at all times when in use. The makers state that economy is one of the features of the tool, and that it can he used for ten consecutive hours per day at a fuel cost



Autocrat soldering iron and blow torch.

of approximately ¼ of a cent per hour. The soldering tip is made suhstantially in one piece. There are no screws, rivets or catch-pins in its construction.

The universal construction of the soldering copper permits of its adaptation to light and fine and also heavy work with the same tip. The "Autocrat" is simple in construction, containing less than a dozen parts in all, and there is nothing ahout it to get out of order. All parts are standard, and are easily replaced in case of loss.

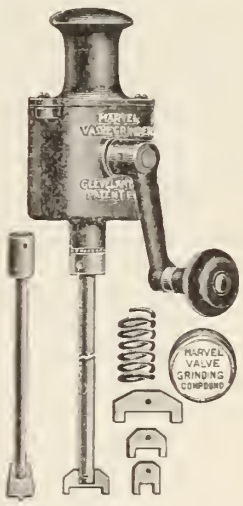
With the soldering tip removed the tool is converted into a hlow torch for all purposes. When lighted it emits a steady blue flame of intense heat, the force heing supplied hy the gas, assisted by the introduction of a special air-mixing system and regulated through the air-tight hurner. The gas can he turned off entirely at this point or regulated at the will of the operator.

The hlow torch is imediately convertihle into a soldering tool for any purpose hy simply attaching the soldering tip to the hlow tube with the set screw provided for that purpose.

The accompanying illustrations show views of the soldering iron and blow torch.

VALVE GRINDER AND SOCKET WRENCH

The Marvel Accessories Mfg. Co., West 6th Street, corner Lakeside Ave., Cleveland, Ohio, offers to the trade the Marvel valve grinder, here illustrated. The makers state that the Marvel grind-



The Marvel Valve Grinder

er saves considerable time in grinding valves, makes a perfect smooth seat, always laps—does not stop at the same spot, cannot leave rings or ridges, insures good compression. To operate, turn the handle in one direction, and the valve turns hack and forth, always a little further in one direction than the other. There is no rocking, and the makers state, you don't have to stop every few turns to lift the valve.

Analysis of Canadian Plumbing Bylaws

Proposed New Plumbing By-law for Montreal—Many Clauses Not Only Ridiculous, But Impracticable, Proving That Sanitary Engineers Should be Consulted in Such Matters—The Sanitary Engineer Takes Full Responsibility for the Criticism Published in This Series of Articles.

ARTICLE 5

THE last section commented upon was Number 634, and referred to the size of soil pipes above fixtures. It mentioned that a soil pipe stack serving as a vent could be either cast iron or galvanized. This would not be good practice. It is always best to demand uniformity in pipe, that is to say, a line of pipe should be all made up of the same material. Cast iron has proved so far to be the most serviceable for plumbing installations.

Waste Pipe Serving Sixteen or More Fixtures

Section 635.—The waste pipe, if of cast iron, either vertical or horizontal, receiving the discharge of sixteen (16) or more fixtures, shall not be less than three inches (3 in.) in diameter. If it be of galvanized wrought iron, then it shall not be less than two and one-half inches (2½ in.) internal diameter.

This section is not by any means as clear as it might be. For instance, it practically says that 16 fixtures may be installed on a pipe 3 inches in diameter (if cast iron) or 2½ inches if galvanized. We cannot see any reason why more fixtures should be allowed on a 2½-inch than a 3-inch pipe, because whatever the make of pipe, the capacity is the same if existing conditions are the same, such as height, length, pitch, etc.

Further, while this clause mentions fixtures, it does not state what constitutes a fixture and it would be very easy for some person to assume the "fixtures" in this case may mean w.c.'s as well as lavatories, sinks, laundry tubs, etc. At the same time the practical man would in all likelihood know that a waste pipe refers to pipes conveying waste water from these latter conveniences, but not including w.c.'s. It may not be generally known that while a soil pipe may be used as a waste pipe, it would never do to use a waste pipe as a soil pipe, particularly where as many as 16 fixtures, whatever kind they may be, can be installed on to a 2½-inch waste pipe.

A soil pipe is a pipe to which w.c.'s are connected to convey the soil waste, the term "soil" in this case deriving its origin from the old-time term "night soil." Thus, we call a pipe which receives the discharge from a w.c. a "soil pipe."

Further, in this connection, when referring to it being possible to connect 16 fixtures to a 2½-inch galvanized pipe or 3-inch cast iron pipe, these fixtures should be defined, because it would not even be good practice to install 16 laundry tubs to pipes of such size, on account of the fact that in all probability quite a large number of laundry tubs would be in use at the same time.

Alignment of Pipes

Section 636.—The arrangement of sewer, drain soil, waste, vent and down pipes shall be as direct as possible.

Angle of Fittings

Section 637.—Excepting as provided for in these rules, all changes in the direction of sewer, drain, soil, waste and down pipes shall be made with one-sixteenth (1-16 in.) ⅛ or 1-6 bends or by Y branches.

The two sections 636 and 637, are in no way necessary, as the same matter is really dealt with in a manner in section 621, another instance which goes to prove our assertion that many sections are empty repetitions and meaningless.

Crosses, Saddles, Etc.

Section 638.—It is forbidden to use straight crosses, saddles and branches at right angles.

Section 638 is one which should have received more consideration. It is really of greater importance than at first appears. For instance, it should be forbidden to make any branch or change of direction at less than a 45 degrees angle when on the horizontal or vertical, and no double Y should be allowed when on a true horizontal line, providing there be more than 4 w.c.'s on each branch, and they are on branches of 5 feet or longer. In such cases two separate Y fittings should be used. It can be easily noted that if there be a number of fixtures, such as w.c.'s on two 4-inch branches laying flat, there is every chance of an obstruction at the double Y if more than one w.c. is flushed at the same time. It would be quite a different matter if the double Y were inserted in a vertical line.

Down Pipes Ten Foot (10-Ft.) Limit

Section 639.—Any external or internal down pipes the opening of which is at a point within ten feet (10 ft.) of any opening of a building, or of an adjoining building, shall be satisfactorily trapped and vented and supplied with water, or it may be discharged into an open hopper having an outlet which shall not be less than the diameter of the down pipe it serves, and the hopper shall be suitable and satisfactorily supplied with water from the nearest fixtures.

We are at a loss to discover the meaning of this section. It would seem to be the compilers' intention to say that any outlet 10 feet or less from any opening near a building shall be trapped, and that such traps shall have provision made to keep them full of water, etc.; otherwise the section has no meaning at all, as far as we can see.

Down Pipe Supply and Vent

Section 640.—Any down pipe which requires to be trapped and supplied with water shall be vented as provided for in section 676.

This section would imply that every trap would be defined as a fixture if said trap be on a vertical line. But, in the first place we fail to know why "any down pipe should require to be trapped" under any conditions. The following is a copy of Section 676 so that our readers will know what the provisions referred to are.

Section 676.—All fixtures shall be effectively trapped and vented, and the traps and vents shall be placed as near as practicable to the outlet of the fixtures served.

Restrictions

Section 641.—A down pipe shall not be used as a soil, waste or vent pipe, nor shall a soil pipe or vent pipe be used as a down pipe, unless specially provided for herein.

It might be well to mention before proceeding further that when "down pipes" are being referred to, there are what should rightly be termed "rain water leaders," and with this section, 641, we do not entirely agree.

There are conditions where the water from a deck or hopper roof could easily be allowed to flow down the soil

pipe, providing this branch to the hopper was inserted below the vent pipe. Say in a small pair of houses, where there is only w.c., lavatory, sink and bath on a 4-inch soil pipe, the vent could be connected at the foot of the stack and carried up to a point above the hopper branch. This argument goes to prove our oft-repeated contention that all by-laws should be illustrated with plans.

Down Pipe Main and Porch

Section 642.—All main down pipes shall run to and connect with the main sewer or drain line direct. Down pipes serving a porch may discharge into a receiving hopper, but it is forbidden to discharge a down pipe serving a main roof on to a porch roof and thence through the porch down pipe into any hopper or fixture.

Down Pipe

Section 643.—When down pipes are placed inside of a building, or when passing through a porch, they shall be of cast iron or of galvanized wrought iron and shall be properly caulked with oakum and lead, the same as rerequired for soil or waste pipes.

Down Pipes Outside

Section 644.—Excepting galvanized wrought iron down pipes, all outside down pipes shall be constructed of cast iron for a distance of not less than five feet (5 ft.) above the ground line. The entire outside down pipe may, however, be of standard cast iron pipe.

Down Pipes Connection

Section 645.—The connection between the cast iron and the sheet metal parts of a down pipe shall be made with a brass ferrule, soldered to the sheet metal and caulked with oakum and molten lead into the cast iron. The connection between the galvanized wrought iron and sheet metal of a down pipe shall be made by a soldered connection. It is forbidden to use brass sleeves for this purpose.

Very little comment can be made on Sections 642, 643, 644 and 645, except as regards the last paragraph of 645. We cannot see why a brass soldering nipple should not be used when connecting the sheet iron to the galvanized iron pipe. In cases where a brass ferrule is used to connect the sheet iron to the cast iron, it would be far better if a few copper rivets were used before the galvanized pipe be soldered to the ferrule, the same with a solder nipple.

SANITARY INSTALLATION FOR FARM AND DAIRY

Continued from page 19

statement as this may at first sound somewhat extravagant, but it is, nevertheless, true. In order to test it let us consider for a moment a few figures relative to the cost of the upkeep of a home in a large city.

A city, for instance, such as Toronto is worth approximately a thousand million dollars. Taxes for the general upkeep amount to over fifteen million dollars. This sum is collected from various sources of taxation and is spent in ministering to the civic requirements of something under half a million people and works out to about $33 per head. Taking the average family as consisting of five persons this means that each family pays something like $160 annually for the privilege of living in the city. This does not include rent, lighting, car fares and a hundred and one other things which draw money from the pocket of the worker. Now it is an undoubted fact that with the same amount of money spent, per person, in a rural home with no large million-dollar sewage-disposal systems, no million dollars worth of sewers and no million dollar waterworks system to keep up, the cost of living would be brought down to quite a modest figure.

Let the sanitary and heating engineer get down to brass tacks and figure out the cost of a home with a well, a sewage disposal plant, pneumatic water system, private gas plant (of which we shall have something to say in our next article) and the various other conveniences it is in his power to supply and he can soon show the rural dweller how much more independent he is than is the man who lives in a debt-ridden city. The "Sanitary Engineer" maintains that if we wish for ideal conditions of living we must cease to congregate in large cities and must get back to the land. If, however, the cities must continue to increase, let us build scientifically so that the air we breathe and the water we drink shall not become polluted but shall be as pure as modern sanitary science can make them. Then, and then only will our health departments have justified their existence. To attain this end what we should really aim at building is big villages, and in this no one can play so important a part as the sanitary and heating engineer.

With these preliminary remarks let us now get down to the subject of our article. This we will do by illustrating in this issue a plan for the watering of cattle. Such a system is simple, easy to install and not costly. It does away with the carrying of hundreds of gallons of water to the cattle. It can be fitted to a pneumatic water system very easily, or, if there is at present either an elevated tank or attic tank, this system can be attached to either.

The piping is run under ground either below the frost line or in suitable conduit, many of which are to be had from the various manufacturers of pipe coverings. This pipe is run to an automatic tank, fitted with a good quality ballcock. Tees should be used at every 90 degree turn, and plugged. The cups or troughs are of cast iron, about 8 inches wide; circular and about 6 inches deep. The water never to be more than 3 inches deep, just enough to allow the cattle to suck it up. The tank capacity should be about 6 to 10 gallons according to the number of cattle likely to use it, and ¾ inch galvanized pipe would be large enough where 35 to 50 lbs. pressure is maintained. The pipes from the tank to troughs should be not less than 1 inch.

We propose, in our next article, to describe a very novel gas plant for use in rural or farm homes; a plant which can be used in exactly the same way as where ordinary coal gas is available with similar arrangements for heating, cooking, etc.

(Continued in next issue)

THE MODERN CITY

The modern city is ever changing, loose in its organization, casual in its form. It grows up, or extends suddenly, no man knows how, in a single generation—in America in a single decade. . . . In a century, it changes its population over and over again, and takes on two or three different forms. In ten or twenty years it evolves a vast new suburb, a mere wen of bricks or stone, with no god or demi-god for its founder, but a speculative builder, a syndicate or a railway. The speculative builder or the company want a quick return for their money. The new suburb is occupied by people who are so busy, and in such a hurry to get to work that in taking a house, their sole inquiry is—how near is it to the station, or where the tram-car puts you down. . . . A modern city is the embodiment of indefinite change, the unlimited pursuit of new investments and quick returns, and of everybody doing what he finds to pay best. The idea of Patriotism, Art, Culture, Social Organization, Religion—as identified with the city, springing out of it, stimulated by it—is an idea beyond the conception of modern men.—Frederic Harrison.

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

Article 15.

DURING the past few years the Commission of Conservation of Canada have had made an Agricultural Survey of rural districts in the different provinces. This survey included a sanitary inspection of water supplies. The results of this inspection are of interest: as they also point out opportunities for the sanitary engineer, they are given in part here:

Prince Edward Island

Report of 1913.—The water supply on the farms visited might be improved. To find water on tap in the house or barn is a rare occurrence. When 12 per cent. of the wells are within 25 feet of the privy pit, it can scarcely be said that, from a sanitary standpoint, the water supply is above suspicion. This nearness to the source of contamination is positively dangerous, when it is considered that the soil of Prince Edward Island is of a very loose, open and porous nature.

Report of 1914.—The water supply in most cases is sufficient, but it is seldom situated as conveniently as it could be. In many instances, it does not require the aid of a chemist or bacteriologist to determine that it is at least unsafe. Wells dug many years ago, close to the buildings, are nearly always the source of supply. These are not as carefully protected as they should be, and on account of the porous nature of the soil of the Island, seepage from a source of contamination has little difficulty in finding its way into the well.

Nova Scotia and New Brunswick

Report of 1913.—In most instances the water supply on the farms visited was good. In the districts along the river valleys the supply is often obtained from springs in the hills. Quite a number of the farmers have water piped to the house and barn; but there are many others who have not these conveniences, but who could, with very little trouble, have a system installed, thus affording an excellent water supply for house and barn use.

Report of 1914.—Very few of the farmers have water on tap and other modern conveniences in the house. The water supply is abundant in many districts, in the form of springs and brooks, but the general sanitary conditions should be greatly improved around many of the farm houses. The water closet is often too close to the source of the water supply to be safe.

Quebec

Report of 1913.—In the matter of water supply, convenience is sometimes considered and very little thought given to the sanitary conditions surrounding the source of supply. In Huntingdon County, fifteen of the twenty-five farmers visited had water on tap in the house; twelve farms had windmills, and in several cases the well from which the water for home use and for the stock was obtained was situated right in the middle of the cow yard.

Report of 1914.—In some districts there are splendid and easily available water supplies. In such cases, where springs abound, the water is often piped directly to the buildings, or can be conveyed there by means of hydraulic rams or pumps. Where conditions are so favorable, there is little excuse for not having running water in the farm buildings, but there are many farms that are not thus equipped. The initial cost being seldom great and the saving of labor derived therefrom are features of great importance. In many instances the water is piped to the yard, and with little more expense it might be running into the house and stables, thus giving all city conveniences at the mere cost of installation. In other districts, where the land is flat, lack of a plentiful supply of water is keenly felt. Where such is the case, water is obtained wholly from wells, many of which are very deep, making it hard work to draw the water. In very few cases are shallow wells found that give any degree of satisfaction. Many of the farmers have storage tanks for rain water in the upper storey of the house, and in this way they have soft water on tap for washing purposes. As would be expected on this flat land, the sanitary conditions are anything but desirable. The inadequate supply of water, with the poor natural drainage, does not so easily permit of the use of modern sanitary conveniences.

The water from this farm well is liable to contamination from the stagnant pool of manure water which drains down from the adjacent barnyard. The outlet of the pool is choked.

Ontario

Report of 1913.—Water for house use is, in nearly every instance, obtained from wells. In some few instances it is taken from springs. The wells are too often poorly located, and there is much danger of contamination. In many cases the water has to be carried too far, thus necessitating much drudgery

for the women on the farms. In some districts the rolling nature of the land makes sanitary water installations fairly easy. Where drive wells (see Fig. 35) are used, the supply of water is usually good. The situation of the water closets is very often far from ideal, and too many dug-wells are closer to these than are safe.

Report of 1914.—In the districts visited, the water supply was abundant, and in most instances the farm buildings were well laid out, so that the water supply is free from contamination. Water is obtained principally from wells and usually carried into the house in pails. In some districts water was obtained from springs. Many of the wells, from which water for stock was obtained, are not properly situated, and little care is taken to prevent contamination. The wells on the whole, however, are fairly sanitary. Very few of the farmers have bathroom and modern conveniences in their houses. In Timiskaming district the water supply was also found to be abundant. A number of the farmers obtain their supply of water from flowing springs. Some farmers, however, are still using water from shallow wells which are not well situated with regard to surface drainage. A good

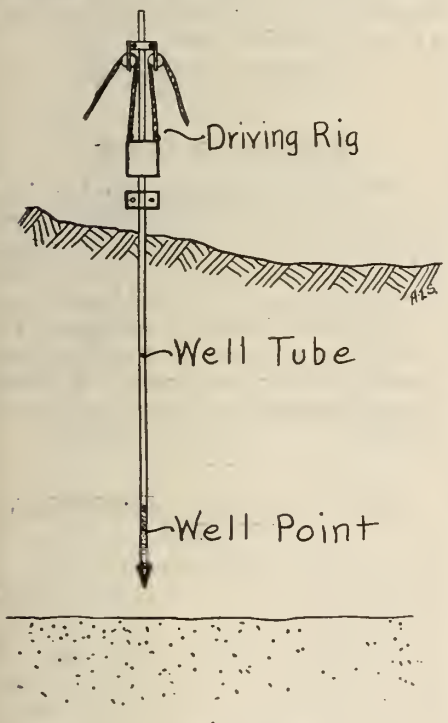


Fig. 35

supply of water can be had by drilling from 50 to 100 feet in the rock.

Manitoba

Report of 1913.—In some districts visited, hard and soft water were found in many of the kitchens. While at first sight it would seem that wells under the kitchen and close to or in the stables would contain impure water, such is not the case; for these wells are drilled, sand-points (see Fig. 36) are used, and, the whole being carefully sealed up, the water is of a good quality. Very few cases of typhoid or other diseases have been caused by impure water.

Report of 1914.—In the Souris district the water supply is very unsatis-

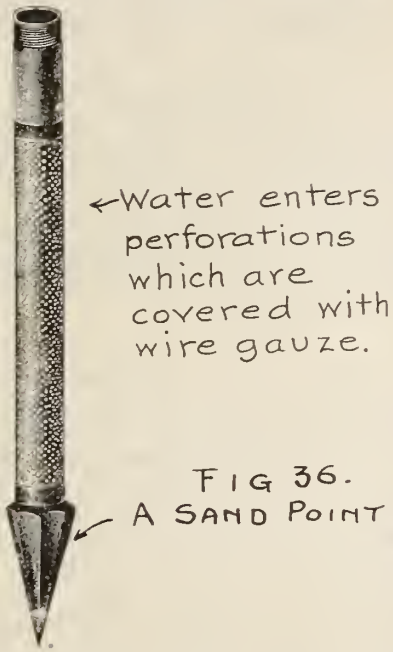


FIG 36.
A SAND POINT

factory, being so brackish that it could not be used for the house. Many of the farmers have to draw water from a distance. Throughout the Pilot Mound and the Gilbert Plains district the water supply is of good quality and easy to obtain, no trouble being reported by any of the farmers in the districts. More attention, however, should be paid to the situation of the wells, some being very close to the stables and receiving the drainage from them. Very few have hard water on tap in the house, but the majority have soft water cisterns in the basement.

Saskatchewan and Alberta

Report of 1913.—In these prairie provinces the water supply is obtained from wells, the most of which are drilled. In some cases the water supply comes from shallow dug-wells, and is limited and often of poor quality. The deep drilled-well gives the best water. While the water supply is generally good, insufficient thought has been given to the relation of the water supply to possible sources of disease, such as water closets and out-buildings. In some cases the drainage from the latter is not away from, but toward the water supply. Very often the aim is to get water at any cost, the question of possible contamination has, in some cases, been overlooked.

Saskatchewan

Report of 1914.—In the Melfort district, the water is distinctly alkaline, and about 90 per cent. of the farmers use rain water for household purposes, many of the houses being provided with metal roofs in order to avoid dirt of any kind lodging on them. Many of the farmers store ice for use in cooling water. In the Yorkton district, the water supply for the most part is good and, as a rule, plentiful. Little attention has been paid to the situation of the well, from a sanitary point of view. It has been dug at a point likely to yield a good supply of water, regardless of its proximity to the out-buildings.

In the Lloydminster district, the problem of getting a sufficient supply of water is a serious one for many of the farmers, some of them having to haul the water one or two miles for both the stock and house use. Good water may be obtained by drilling to a depth of 100 to 200 feet, but many of them have not the capital to undertake this work. The difficulty of getting water has prevented many of the farmers from going more extensively into cattle and hog-raising.

Alberta

Report of 1914.—In all the districts visited, the water supply was found to be ample and of good quality. Quite a number of windmills were seen. The sanitary conditions in the Camrose district were found to be fair, but in some instances the manure piles were too near the well to insure freedom from contamination. On one farm in the Innisfail district the well was under the house, and on several farms there was not a water closet of any kind. In the De Winton district, drilled-wells are quite common, and are usually from 75 to 100 feet deep. There are also a number of small streams in the district which supply water for stock. Sanitary

Earth and Clay Augurs

Fig. 37

conditions were found to be fairly satisfactory.

British Columbia

Report of 1913.—The water supply is obtained from wells, streams and springs, about an equal number of each. As there are many excellent mountain streams, it is not difficult to obtain a

(Continued on page 31)

Water Supply Systems for Country Homes

The First Principles Involved in Water Supply Systems—How to Choose a System to Suit Certain Conditions—Methods of Installation and Other Useful Data.

THE question of proper water supply systems has become one of great importance of late, much more than was the ease comparatively a few years ago.

Pneumatic water systems are to many members of the trade to-day, very mueh of a mystery. This should not be the case. as all such systems, if they are efficient should also be simple.

If applied meehanics has accomplished anything, it has inereased their efficieney and simplified eonstruction. In no case can any machine be as efficient as it might be, if it is unnecessarily complicated; and in ehoosing any pumping oufit. whether it be for an open tank or a elosed or pneumatie system, simplieity of eonstruetion should be one of the main features considered.

The next features should be easy adjustments, minimum of friction, continuous lubrication, and no lost motion.

When a pumping unit is being chosen for an open tank, such as may be placed either in an attic or on a lower floor, there should be some provision made to show when the tank is full, or empty, and a good side overflow furnished. There are many ways in which this can be done. and many appliances on the market for this purpose, some are too complicated, while others are simple. Simplicity is in 9 times out of 10 the most dependable feature of these automatic applianees.

In all eases, the pump should be located as near as possible to the water to be pumped, 15 feet being a very desirble distanee.

Of course we are aware that a deep well pump may be any height above the water level, because the cylinder of a deep well pump may be submerged to almost any depth, but with the ordinary house pump, where it has to be located in the basement, 15 feet is about a nice distance to raise water, and particularly so, when there are a number of feet of horizontal pipe as well as the 15 feet straight vertieal left.

Many an ordinary pump has been installed where a deep well pump should have been doing the work and then there have been disputes between sanitary engineer and pump manufaeturer, when by using a little judgment these disputes could have been avoided.

Not long ago a pump of this kind was installed in a country residence and was aetually pumping water from a well 35 feet deep with the water 28 feet from the top of the well. This happened to be a lower well and the pipe 4½ in. The suetion pipe was 1¼ in. The water supply however was not constant and the pump lowered the water in two or three minutes, and of eourse lost its suction, because the level of the water got beyond the pumping limit, 33 feet being the maximum. This resulted in serious trouble which could have been avoided had the souree of supply been first determined and a proper pump specified in the beginning. It is only by beeoming acquainted with certain conditions, source of supply, quantity of supply, etc., that the proper pumps can be chosen for each partieular case. Then there is the general principle of pumping involved. When water is being pumped, or raised by any meehanical means, it is lifting water from a lower level to a higher, against atmospheric pressure, or it is decreasing that atmospheric pressure by raising the water. To enable it to do this certain natural laws must be taken into eonsideration. For instanee, when a pump has established suction, when it has pumped all the air out of a pipe and displaced that air with water, it has relieved all atmospheric pressure from that water, and if the pump is not given all the assistanee possible to maintain that suction by retaining some water at the level established, the water will reeede to its former lower level. The only way to hold this level is to fit a reliable foot valve at some point on the suction line where it will always be submerged, preferably at the extreme end of the pipe.

This is one of the very first essentials and most important on a suction line even though the distance be but a few feet.

Take an ordinary pitcher pump situated in a kitehen, which is used to pump water from a soft water cistern only a few feet below. It is a eommon thing to have to give the pump 10 or 12 quick strokes in sueeession before any water will flow, and, after that the water comes readily. Now, if a foot valve were fitted to sueh a pump the chances are instead of having to pump 10 or 12 strokes the water would come at the first stroke.

Think what that means in a kitchen, where the pump has to be operated a seore of times a day, therefore, if the foot valve is of such importance on a eistern pump, how much more is it necessary on a suction line 25 or 30 feet long, not of course in a vertical position. Then again, most pitcher pumps are of larger diameter than a pump used for a small open tank or pneumatic water system, where the stroke may be shorter as well as quicker, yet not have as large a displacement.

Continued in next issue

EDITOR'S NOTE.

The installation of pneumatic as well as open tank water supply systems is becoming more in demand than ever, and conditions may arise with which some of our readers may not be quite familiar.

We will be only too pleased to advise in any such case, either through the pages of The Sanitary Engineer, or, if necessary, by mail, providing, of course, we are furnished with full name and address of enquirer. Rough sketches should accompany all enquiries, so as to enable us to reply promptly.

THE ORIGIN OF O.K.

More than a century ago the best tobaceo eame from Aux Cayes (pronounced O.K.), and the best of everything was thus designated at that time. The phrase came to general use in America during Jaekson's campaign, because it was charged that he had used these letters for the approval of official papers, meaning that they were "orl krect."

HOUSING OF THE INDUSTRIAL WORKER

(Continued from page 15.)

be more than the difference in actual amount of rent paid.

In Canada, problems exist that are non-existent in such countries as England. Partly owing to climatic eauses, the wages paid to bricklayers, masons, plasterers and plumbers are very high, often over three times the wage rates paid in Europe. With temperatures ranging from under 30 degrees below zero up to and over 95 degrees above, making a difference of over 125 degrees, as against a difference of about 70 degrees in England, eonstruction work and the cost of eonstruction work must of necessity present different and also difficult problems.

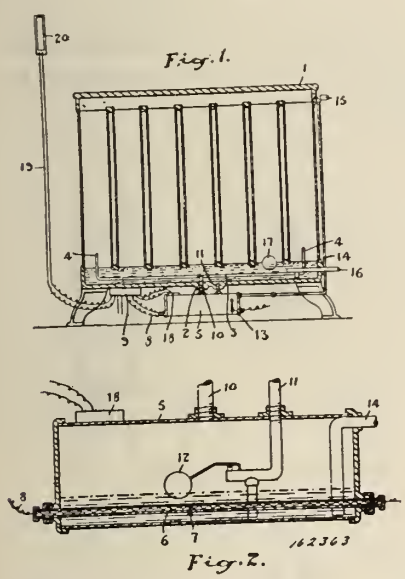
New Canadian Patents

No. 162,363. Heating System.

George Edward Harrison and John Templeton, co-inventors, both of Toronto, Ontario, Canada, 4th May, 1915; 6 years. Filed 28th January, 1915. Receipt No. 247,443.

Claim.—1. A heating system comprising a radiator, a water supply connected to said radiator, means for maintaining a constant level of water in the radiator, a steam boiler, a steam pipe leading from said boiler to said radiator and extending above the high water lever therein, a water supply to said boiler, means for automatically regulating the level of water in said boiler, means for heating the water in said boiler, and automatic means for controlling said heating means.

2. A heating system comprising a radiator, a water supply connected to



said radiator, automatic means for maintaining a constant level of water in the radiator, a steam boiler, a water supply pipe leading from said radiator to said boiler, means for automatically controlling the level of water in said boiler, a steam pipe leading from said boiler to said radiator and extending above the high water level therein, means for heating the water in said boiler, and automatic means for controlling said heating means.

3. A heating system comprising a radiator, a water supply connected to said radiator, automatic means for maintaining a constant level of water in the radiator, a steam boiler, a water supply pipe leading from said radiator to said boiler, means for automatically controlling the level of water in said boiler, a steam pipe leading from said boiler to said radiator and extending above the high water level therein, means for heating the water in said boiler, a thermostat arranged on said boiler above the high water level, means operated by said thermostat for cutting out said heating means on an excessive rise in temperature, and automatic means for regulating said heating means.

4. In a heating system, the combination with a radiator, of a steam boiler having a steam outlet connected to said radiator, said boiler having tubes extending therethrough, electric heater coils arranged in said tubes, a water supply to said boiler, means for automatically controlling the supply of water to said boiler, a thermostat arranged on said boiler adapted to cut out the electric current to said heater coils, and automatic means for regulating the flow of electric current to said heater.

5. In a heating system, the combination with a radiator, of a steam boiler having a steam outlet connected to said radiator, said boiler having tubes of insulating material having a high heat conductivity extending therethrough, electric heater coils arranged in said tubes, a water supply to said boiler, means for automatically controlling the supply of water to said boiler, a thermostat arranged on said boiler adapted to cut out the electric current to said heater coils, and automatic means for regulating the flow of electric current to said heater.

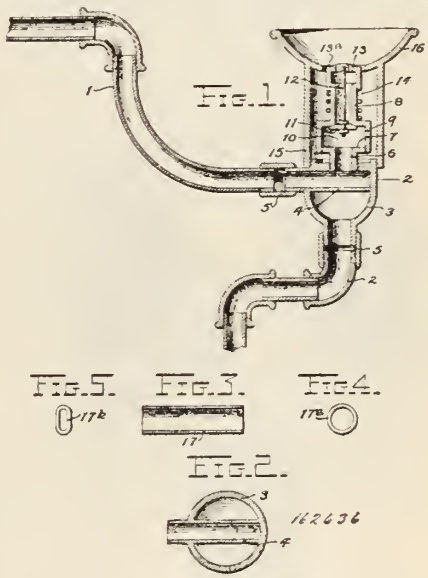
6. In a heating system, the combination with a radiator, of a steam boiler having a steam outlet connected to said radiator, tubes extending through the ends of said boiler, packing glands encircling the ends of said tubes, electric heater coils arranged in said tubes, and means for controlling said heater elements.

No. 162,636—Fountain

Joakim M. Ingberg, Mayville, North Dakota, U.S.A., 18th May, 1915; 6 years. Filed 22nd March, 1915. Receipt No. 249,585.

Claim.—1. A sanitary drinking fountain including a bowl, a tubular member extending transversely across the mouth of the bowl, a supply pipe leading to the tubular member, a drain pipe leading from the bowl, an upwardly extending outlet pipe communicating with the tubular member and arrange axially with respect to the bowl, a valve within the outlet pipe, a perforated cap member slidably mounted upon the discharge end of the outlet pipe, an operative connection between the cap member and the valve, a spring normally holding the valve in a closed position, the valve being adapted to be opened by applying pressure to the cap member, a casing applied to the upper end of the bowl and surrounding the outlet pipe, and a dished guard plate at the upper end of the casing, said guard plate having a central opening within which the perforate cap is located.

2. A sanitary drinking fountain including a bowl, a tubular member extending transversely across the mouth of the bowl, a supply pipe leading to the tubular member, a drain pipe leading from the bowl, an upwardly extending outlet pipe communicating with the tubular member, a valve within the outlet pipe, a perforated cap member slidably mounted upon the discharge end of the

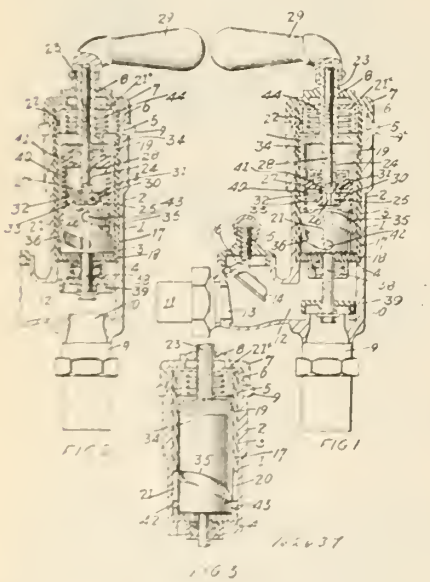


outlet tube, an operative connection between the cap member and the valve, and a spring normally holding the valve in a closed position, the valve being adapted to be opened by applying pressure to the cap member.

3. A sanitary drinking fountain including a bowl, a tubular member extending transversely across the mouth of the bowl, a supply pipe communicating with the tubular member, a drain pipe leading from the bowl, a tubular arm projecting upwardly from the beforementioned tubular member, an outlet tube having an enlarged end which is fitted to the tubular arm, said enlarged end providing a valve chamber, a valve mounted within the valve chamber and controlling the flow of water through the outlet tube,

a perforate cap member slidably mounted upon the discharge end of the outlet tube, a stem connecting the cap member and valve, and a spring normally holding the valve member in a closed position, the valve being adapted to be opened by applying pressure to the cap member.

4. A sanitary drinking fountain, including a bowl, a tubular member extending transversely across the mouth of the bowl, a supply pipe communicating with the tubular member, a drain pipe leading from the bowl, a tubular arm projecting from the tubular member, an outlet tube applied to the tubular arm, a valve chamber being provided at the junction of the outlet tube and the tubular arm, a valve arranged within the valve chamber and controlling the flow of water through the outlet tube, a perforate cap member slidably mounted upon the discharge end of the outlet tube, a stem connecting the cap member and the valve, a spring normally holding the valve in a closed position, said valve being adapted to be opened by applying pressure to the cap members, a casing applied to the upper end of the bowl and surrounding the outlet tube, and a guard member upon the casing.



No. 162,637—Valve Mechanism

Gilbert William Isley, Toronto, Ontario, Canada, 18th May, 1915; 6 years. Filed 4th March, 1915. Receipt No. 248,719.

Claim.—1. A valve comprising an outer cylindrical member, an inner cylindrical member having circumferential spiral slots extending from each side of such member in opposite directions, means for holding the inner cylindrical member within the outer cylindrical member so as to be free to rotate therein, a cylindrical member slidably held within the inner cylindrical member, a valve head carried thereby, projecting pins extending from the cylindrical portion of the valve head through the spiral slots, and means for preventing the rotary movement of the cylindrical portion of the valve head.

2. A valve comprising an outer cylindrical member having vertical opposing slots therein, an inner cylindrical member having spiral slots therein extending from each side of such member in opposite directions, means for holding the inner cylindrical member within the outer cylindrical member so as to be free to rotate therein, a cylindrical member slidably held within the aforesaid inner cylindrical member, a valve head carried thereby, projecting pins extending from the cylindrical member of the valve head from diametrically opposite sides thereof into the spiral slots of the inner cylindrical member, and vertical slots of the outer cylindrical member, and an operating stem extending from the inner cylindrical member.

3. A valve comprising an outer cylindrical member having vertical opposing slots therein, and internally threaded at its upper end, an inner cylindrical member having an external thread at its upper end and circumferential spiral slots extending from each side of such member in opposite directions, a cylindrical member slidably held within the aforesaid inner cylindrical member, an inner cylindrical member, a valve head carried thereby, projecting portions extending from the cylindrical member of the valve stem into the spiral slots of the inner cylindrical member and vertical slots of the inner cylindrical member, and an operating stem extending upwardly from the inner cylindrical member.

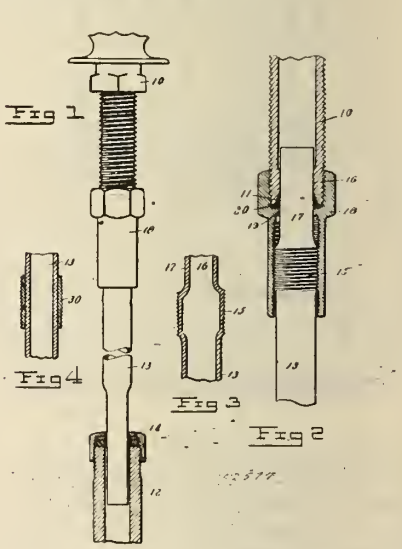
4. In a valve, the combination with the valve casing having a suitable valve seat at its lower end and the usual outlet and inlet orifices, of a cylindrical member fitting within the valve body and having longitudinal diametrically opposing slots therein, an inner cylindrical member having spiral slots extending circumferentially in opposite directions, means for rotatably holding the inner cylindrical member within the outer cylindrical member.

No. 162,577. Coupling for Pipes.

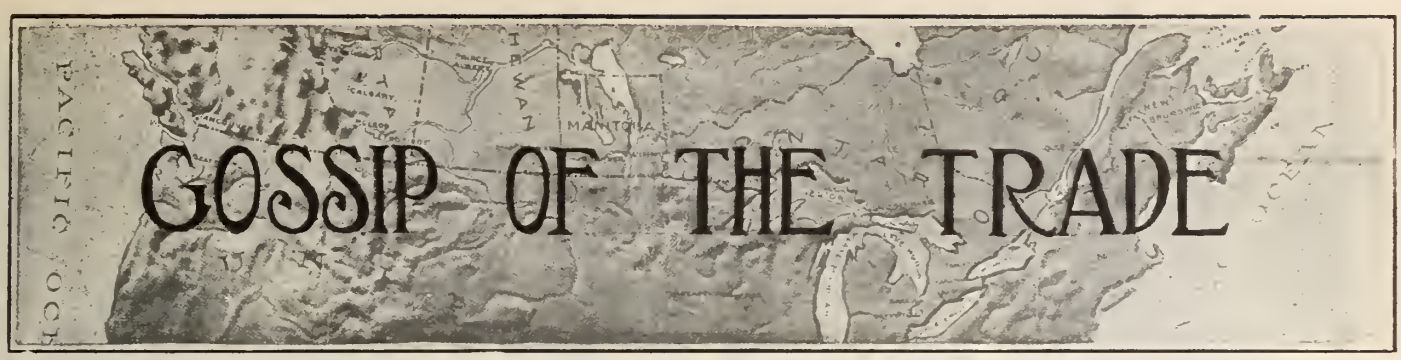
The H. Mueller Manufacturing Company, assignee of Philip Mueller and Anton C. Schuermann, both of Decatur, Illinois, U.S.A., 18th May, 1915; 6 years. Filed 26th February, 1915. Receipt No. 248,518.

Claim.—1. In combination, an externally threaded shank having its inner wall flared at its end, a supply pipe having an enlarged threaded portion adjacent its end and being reduced outwardly of the threaded portion, the reduced outer end of the supply pipe fitting loosely in the shank, a coupling member having internal threads engaging over the enlarged portion of the supply pipe and about the shank, and further having an inwardly extending flange embracing the reduced end of the supply pipe in spaced relation from the end of the shank, and a gasket fitting in the flared end of the shank and resting against the flange whereby the gasket is compressed against the supply pipe by the tightening of the coupling member over the gasket.

2. In a coupling, an externally threaded shank having its inner wall flaring at the end of the shank, a supply pipe extending loosely into the shank and having an enlarged threaded portion extending outwardly from the shank, a gasket engaging in the flared end of the shank about the supply pipe, and a coupling member threaded on the end of the shank and having an inwardly extending flange engaging with the gasket and binding the same in the shank and on the supply pipe, the coupling member having an internally threaded portion extending beyond the flange and engaging adjustably over the threaded and enlarged portion of the supply pipe.



3. In a coupling, an externally threaded shank having its inner wall flaring at the end of the shank, a supply pipe extending loosely into the shank and having an enlarged threaded portion extending outwardly from the shank, a gasket engaging in the flared end of the shank, about the supply pipe, and a coupling member threaded on the end of the shank and having an internal shoulder engaging with the gasket and binding the same in the shank and on the supply pipe, the coupling member having an integral threaded portion extending beyond the said shoulder, and engaging adjustably over the threaded and enlarged portion of the supply pipe.



TORONTO VISITOR

Geo. Ross, sanitary engineer, Brockville, was a business visitor in Toronto recently, and when asked how business was in that fair city, stated that the trade as a whole were as busy as could be. Just at present Mr. Ross is busy getting the plumbing and heating system installed in the new armories at Napanee, where it is expected that upward of 250 soldiers will be billeted for the winter. Napanee's folks are said to be "tickled to death" about it.

OFF DUTY FOR A WHILE

We regret to hear that Mr. C. D. Henderson has had to shake out of harness for a while on account of illness. Mr. Henderson is the right-hand man to T. A. Cowan, sanitary and heating engineer, Brantford, Ont., who just recently issued one of the most elaborate catalogues ever issued by a concern of this kind. And we are told that the catalogue was compiled by our friend Henderson. We sincerely hope that e'er The Sanitary Engineer goes to press he will be greatly improved.

INTERESTING NOTES

Editor The Sanitary Engineer:

A customer of mine called at my store the other day with a few notes evidently taken from a sermon. He had picked them up in the stret, and thought I would be interested in them. The writer of the notes was evidently a champion of sanitation. They read as follows:

"Dear Dr. —— You said to-night that sanitation had nothing to do with the soul. Let's agree to differ, will you??

"What would you think of a family who indulged in family prayer morning, noon and night, and gave to the church to such an extent that the children wore rags and appeared to be ill-fed, and kept a dirty house? I know of several such cases, and I think the minister's first duty in such cases would be to preach the gospel of cleanliness.

"I believe when I read the good old Book, 'Be thou clean,' that it means spiritually, physically and mentally clean. I do not think it possible to be Christ-like unless his or her environments are sanitary. Christ was a **real** advocate of **real** cleanliness. Didn't He say, 'Be thou clean, and 'Go wash?' "

Mr. Editor, if I may be pardoned for adding to the above, I think the writer of those notes is about right.

Believer in Sanitation for
Body and Soul.

USEFUL NOTES FOR SANITARY ENGINEERS

(Continued from page 18.)

Where water is pumped from a lake or river to houses in a town, it is the same in principle as in Fig. 1. Cities receiving water by gravitation from mountain lakes are like Fig. 2.

If water is put into a box which measures oe foot long, broad and deep it would weigh about 62½ pounds. This weight of water rests on a base 12 inches by 12 inches or 144 square inches and weighs equally on each equare inch When the water is one foot high then

each square inch has $\frac{62\frac{1}{2}}{144}$ lbs. of water

on it which is equal to 0.434, or about 3/7 pound.

For every foot the water is increased in height so does the pressure increase. Fig. 4 illustrates how it increases from the top downwards. In practice an easy calculation is made namely to allow one-half pound pressure for every foot in height of water.

Feet head of water $\times$ 0.43 = lbs. sq. in.

Lbs. per sq. in. $\times$ 2.31 = feet head.

Or per sq. in. divided by 0.43 = feet head.

PRACTICAL SANITARY SCIENCE

(Continued from page 27)

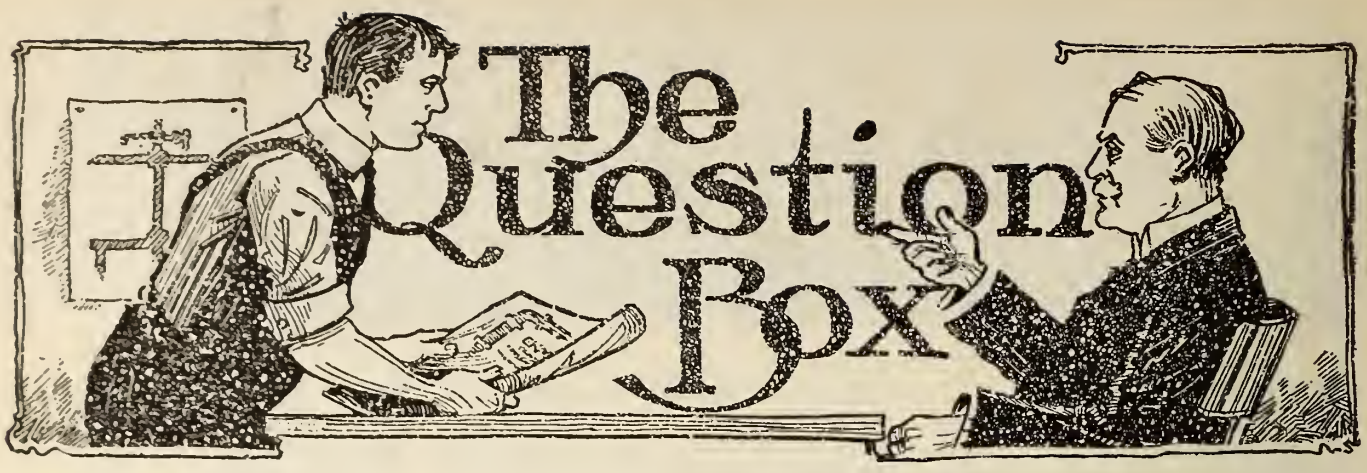
supply of good water for house use if a little care is taken to have it piped or turned to the out-buildings. There are, however, instances where not enough care is taken to prevent contamination. It is pleasing to note that more than half of the farmers visited in British Columbia had water on tap in their houses. Circumstances are such, however, that many more could have the same conveniences if they would but take the trouble.

With regard to driven wells mentioned above, Fig. 35 shows one method of driving wells by means of a weight operated by two men. The size of the well tube generally varies from 1¼ inches to 2 inches in diameter. The well point (one form of which is shown in Fig. 36) is pointed at one end and perforated. The only place at which water can enter the well tube is through the perforations. The well point is connected to the well tube, to which extra lengths are added as the tube is driven into the ground. When the well point reaches the desired water bearing stratum a pump is connected to the upper end of the well tube and the well is complete.

Driven wells, as just described, are suited for driving in soft ground or sand to a depth of about 75 feet. Where the ground is harder or rocky, wells are generally bored or drilled. The whole length of the well is generally cased, making it closed like a driven well, and a strainer or well point used to admit the water. If the water bearing stratum is sand, a point such as shown in Fig. 36 is used. The perforated portion is covered with wire gauze, which should be of a fineness depending on the fineness of the sand encountered.

Under conditions otherwise favorable a layer or stratum of clay or other hard earth, encountered near the surface, may make the sinking of a well by driving a very laborious process. In such a case a well augur can be used to bore its way through the objectionable surface stratum and the driving commenced when strata are reached that can be easily penetrated by the well point. Beds of clay can be passed by forcing a tube open at the bottom to a short depth into the clay, withdrawing the tube and extracting the clay that sticks in it. This operation can be repeated until the clay has been passed through. In Fig. 37 there are shown a number of augurs for use in earth or clay.

(Continued in next issue.)



Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

HOW TO CONNECT ELECTRIC WATER HEATER TO RANGE BOILER

Editor The Sanitary Eningeer:

A customer of mine has a range boiler situated in the bathroom which is connected to a water-front on the floor below.

The range boiler is supplied with water from an open attic tank as shown in sketch enclosed.

He wants an electric water heater connected with the range boiler. Would you please show how it should be connected so as not to interfere with the present connection from boiler to water-front.

C. B. S., Ontario.

Fig. 1 is sketch submitted, and in replying to C. B. S. we show in Fig. 2 how such a heater is connected. As we were not furnished with a sketch of the electric heater, we have shown sketch of one made by the Canadian Westinghouse Electric Co., Hamilton.

There is, however, only one way in which such a heater can be connected when the other connections cannot be moved. It is well to place such heaters in such a position that any deposit of dirt or rust will not accumulate in the heater. Sometimes a piece of pipe is ex-

(Continued on page 34.)

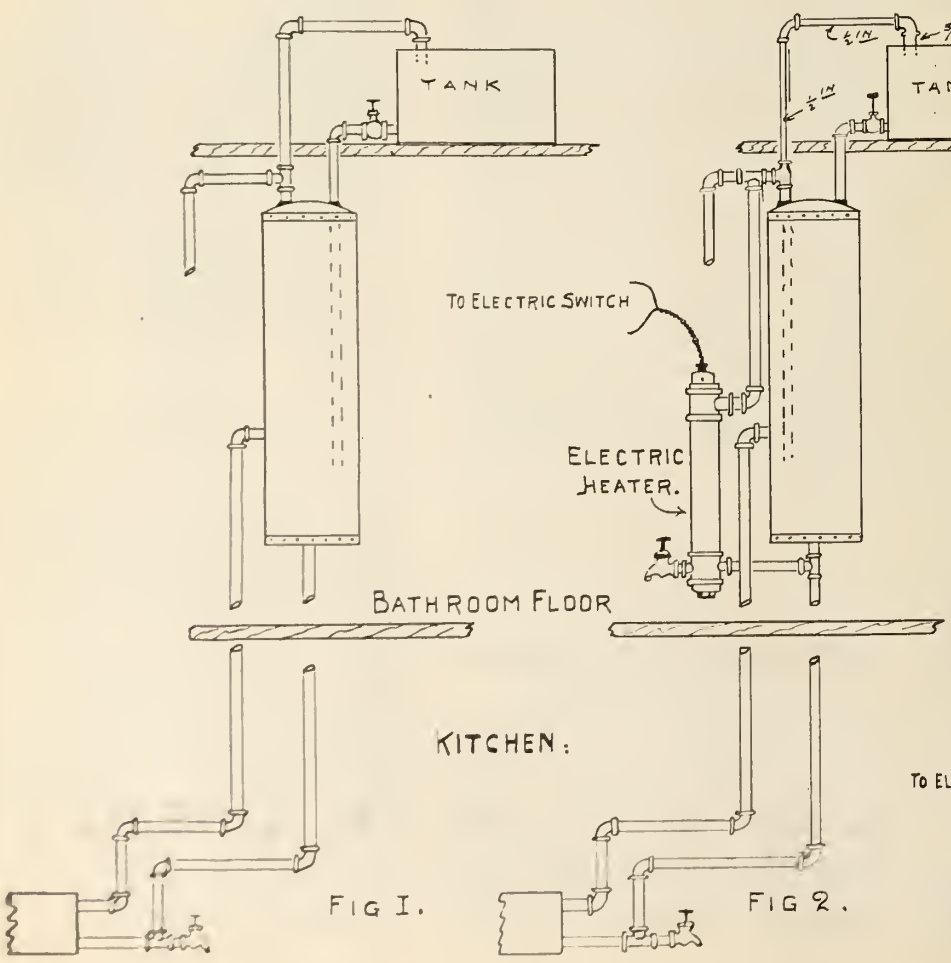


FIG 1.

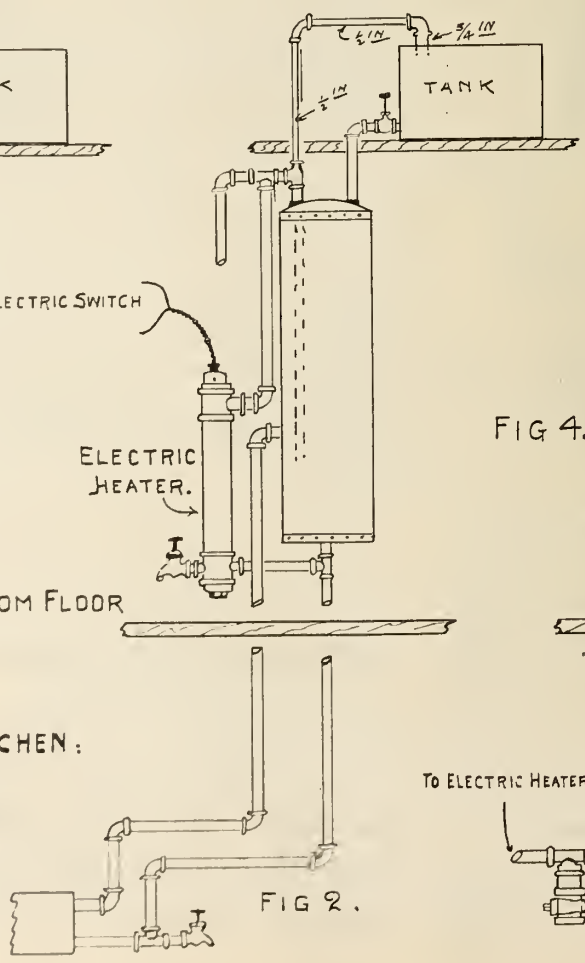


FIG 2.

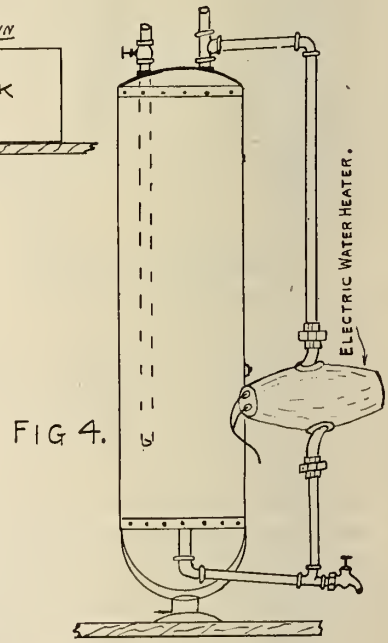


FIG 4.

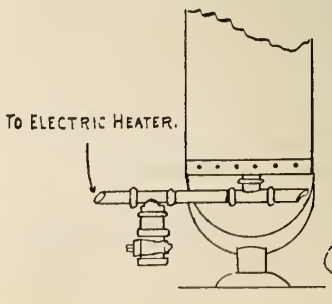


FIG 3.

SMASH!

Peerless Water Systems

AT

LOWER PRICES

AND

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High Quality
Extra Heavy Tank
Complete Specification
Peerless Pump.

YOU CAN SELL

AT THE FOLLOWING

NEW RETAIL PRICES

112 24 x 6 Tank
Old Price $68.00 **New Price $52.70**

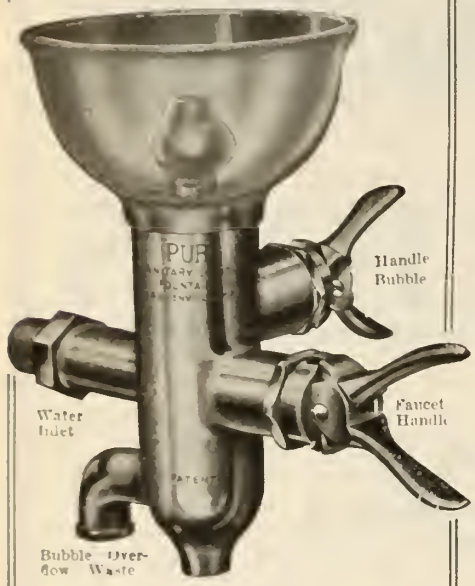
112A 30 x 6 Tank
Old Price $78.20 **New Price $59.50**

112B 36 x 6 Tank
Old Price $86.70 **New Price $72.55**

Drop Us a Card for Your New Prices.

National Equipment Company, Limited

TORONTO, ONTARIO

PURO
(MADE IN CANADA)
Saves Dollars
Why let that old-fashioned faucet go on year after year wasting water—MONEY?
Why more drinking cups and glasses, only to become unsanitary—lost, broken or carried away?
Puro Sanitary Drinking Fountain stops all this needless waste. Puro saves you 35% on the water bill alone. Puro saves you all that money you spend for cups. YET Puro is always ready with a clear cool drink with dollars in the bank.


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You don't have to wait years to get back the small investment you have tied up in Puro equipment—
You start cashing in at once—not only on your water bill saving, but on the increased efficiency of your workers as well.
Man like PURO—it's clean. No danger of deadly germs lurking in its sparkling bubble.
Write us and tell how many men, how many departments and we'll tell you how much the cost will be.
"PURO-FY"
YOUR WATER SUPPLY
Puro Sanitary Drinking Fountain Company
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Consulting Sanitary Engineer
Advice and Plans on Water Supply and Sewage Disposal for Residences, Factories, etc.
H. L. SEYMOUR, B. A. Sc., A. M. Can. Soc. C. E.
BOX 95. SANITARY ENGINEER TORONTO

THE QUESTION BOX

(Continued from page 32.)

tended downward in the form of a pocket by inserting a tee looking down, a nipple and draw-off cock is then screwed into the tee. Any dirt will thus collect in the pocket and can be run off. See Fig. 3.

Fig. 4 is another form of electric heater, but it will be seen that it is connected in practically the same way as Fig. 2. A by-pass tee would be found very beneficial when making such a connection.

WHAT'S THE MATTER WITH THIS JOB ?

Editor the Sanitary Engineer. — A couple of years ago I installed a hot water system in a 5-storey office building. It contained about 7000 square feet of radiator and the installation worked splendidly. It was my first big contract. Last Fall I completed another big hot water job, only two stories, which contains nearly the same amount of radiation and I can't get the satisfaction I did out of my first job. As far as I can see the piping is O.K. and every care was taken throughout.

Could you suggest what is the reason why I don't get the same heat? The boiler is the same size, good draft and lots of pitch, I have no short circuits on the job either. My customer has not kicked about the job but I was not as pleased with the results myself. The temperature of the water does not get anything like as hot with the same amount of firing.

PUZZLED

As our inquirer has not furnished us with either plans or even his address we can only surmise what the trouble might be.

The first job installed was in a 5 storey building and probably none of the horizontal mains are anything like as long as the ones in the last job.

Long horizontal mains cause sluggish circulation. Then there is not the heat in the last job that there is in the first.

For instance, a five storey building each floor being say 10 feet would mean that there would be about 50 feet of a head of water on the boiler, or if the bottom of the boiler were two feet from the floor and the water level of the water in the expansion tank two feet from the top of the ceiling that would be a head of water on the boiler of 48 feet. This would mean a pressure of about 20¾ lbs., or to be exact 20.79. In that case the hot water would circulate quicker and became hotter under such a pressure, and there would, as we said before, be very few horizontal mains of any length.

Whereas the second installation, having only two stories and about the same amount of radiation, would, in all likelihood have a lot of long horizontal mains, and only a head of water approximately of say 22 feet, and a pressure of about ½ lbs. per square inch (9.53). A good heat generator would increase the efficiency of this system without doubt.

Editor.

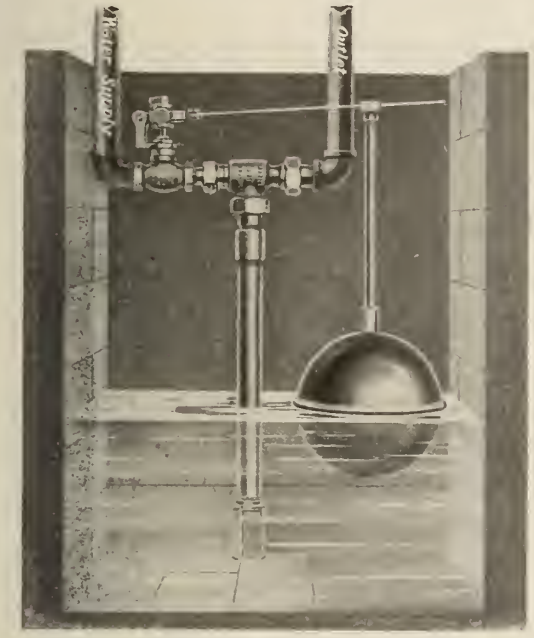
BREATHING PROVISION IN SUBMARINES

THE personnel of a submarine depend for air for breathing purposes, while submerged, on the free air in the boat at the time of submerging and the compressed air carried in storage flasks, which is used in freeing ballast tanks of water as well as for breathing. In the average submarine in commission to-day, the air contained in the boat at the time of submerging is sufficient to last officers and crew, numbering 18 men, for a period of from 9 to 12 hours.

The air carried in the storage flasks is about sufficient to replenish the entire volume of air in the boat twice at atmospheric pressure, provided it is used for no other purpose. The maximum time during which all the air available can be breathed without serious effect, is, therefore, from 30 to 36 hours. In computing this time, the safe amount of CO_2 that should be allowed to accumulate in the air at any time is taken at 2 per cent. Men vary, however, in their ability to withstand the effects of CO_2, the average man being able to withstand about 2½ per cent., while an exceptionally strong man can withstand as much as 5 per cent. Therefore, the time during which life can be sustained by the air in a given boat will depend somewhat upon the powers of resistance to the effects of CO_2 on the part of the personnel.

The air is maintained in condition for breathing by two methods:—First, by slowing bleeding from the main air supply into the boat and pumping air out very slowly; and, second, by allowing the air to become foul and then pumping a part of it out of the boat and replenishing it from the air flasks, at the same time maintaining a normal atmospheric pressure in the boat. The former method has been found more economical of air. The air in the boat is kept in circulation, as it has been demonstrated by experiment that air in circulation may be charged with a much greater percentage of CO_2 than still air without evil effect on the person breathing it.—Marine Engineering.

MORRISON
Automatic Cellar Drainer



The most efficient cellar drainer on the market. Simple and durable.

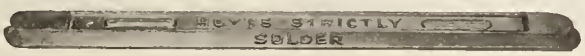
Has double the lifting power of any other cellar drainer made.

Working parts all above water.

These outfits have been in continuous successful service for upwards of two years, without requiring the slightest attention.

The James Morrison Brass Mfg. Company, Limited
93-97 Adelaide St. West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO
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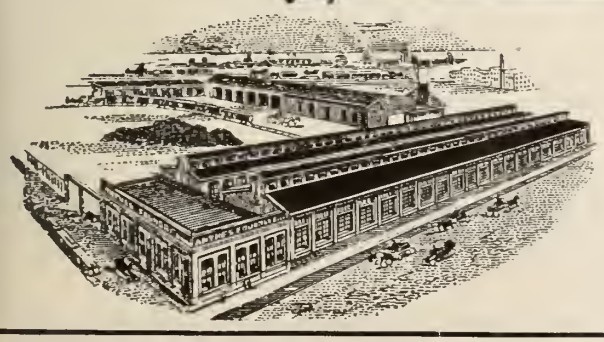
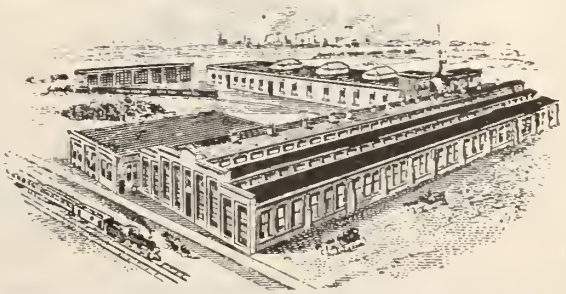
TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG



MANUFACTURERS OF
CAST IRON
SOIL PIPE
AND
FITTINGS



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All Our Screwed Fittings are Machine Recessed

Malleable Fittings

With this brand mean fittings made of Air Furnace Refined Iron, reamed and tapped to gauge with perfect threads.

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With this brand mean fittings made with Iron of high tensile strength—proper proportions and correct tappings.

Standard and Extra Heavy Flanged Fittings and Flanges

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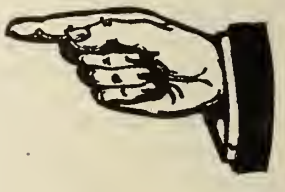

Brand

Pipe Fittings

Are Always a Good Buy

Tapped straight to standard size—machine recessed, and with full and perfect threads.
Proper weight, even thickness—clean and smooth—carefully made from carefully selected iron.
Send a trial order and see for yourself.
Made in Canada.

International Malleable Iron Co., Limited

Guelph, Ontario

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"Digest of the Mercantile Laws of Canada"

PRICE $2.50

At the recent convention held in St. John, N.B., the question of the lien law was discussed.

Every Sanitary and Heating Engineer in Canada should know a little of the laws in force in his province.

This Book contains over 1,000 subjects of interest to every business man in Canada. Write to

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Water Service System

Capacity—150 Gallons per hour.

CUT shows our Type "S" Outfit "A" Silent Electric System, which includes all necessary fittings for complete installation. 1/6 H.P. Century Motor furnished with each pump. Note the special air injector and the automatic controller.

Our special Electric Pump folder will be mailed promptly and cheerfully on request.

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The best possible buyer is not made an actual buyer at a single step.

It is one thing to win the buyer's favor for an article and another to make adjustments incident to closing the sale. Winning the buyer's favor is the work of trade paper advertising.

Under ordinary conditions it should not be expected to do more.

TWO CENTS PER WORD

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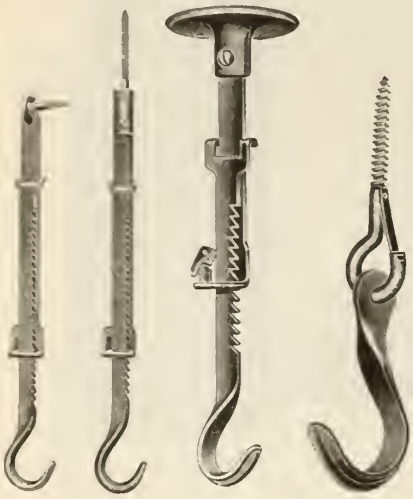
Malleable Iron Hook Hanger
Instantly Adjustable



to any pitch wanted. Simply throw back cam and adjust as desired.

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New Britain, Conn.

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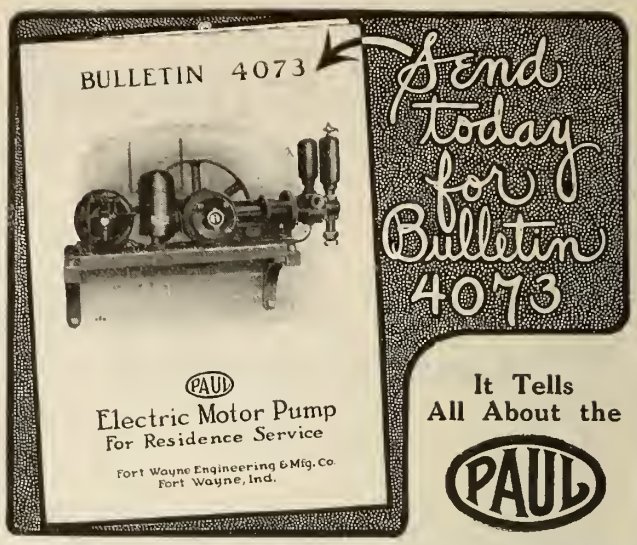

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Give us your port of entry and we will quote you a price delivered to that point.

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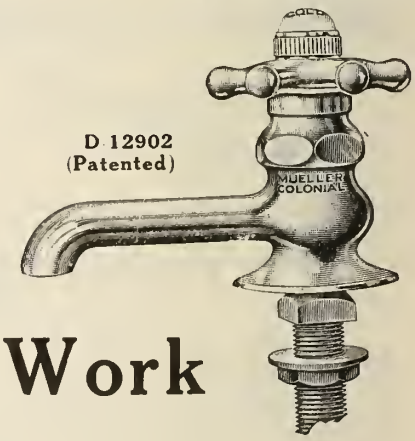
Use goods of established reputation and thereby forestall complaint on the part of your trade. When self-closing work is called for, do not fail to use

MUELLER
Colonial Self-Closing Work

Mueller Colonial Self-Closing Work



This line of goods for the past ten years has proved exceptionally strong in service-giving qualities. It's a clean-cut, handsome line, against which no objection can be urged. It will not disappoint you and will please your customer.

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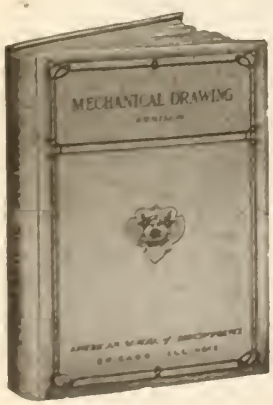

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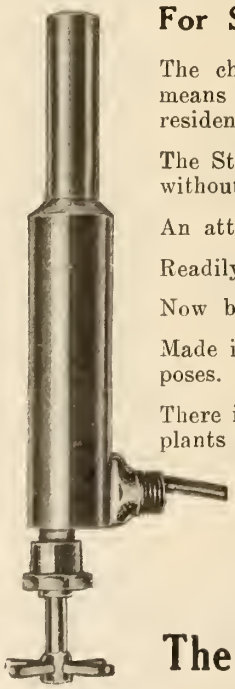

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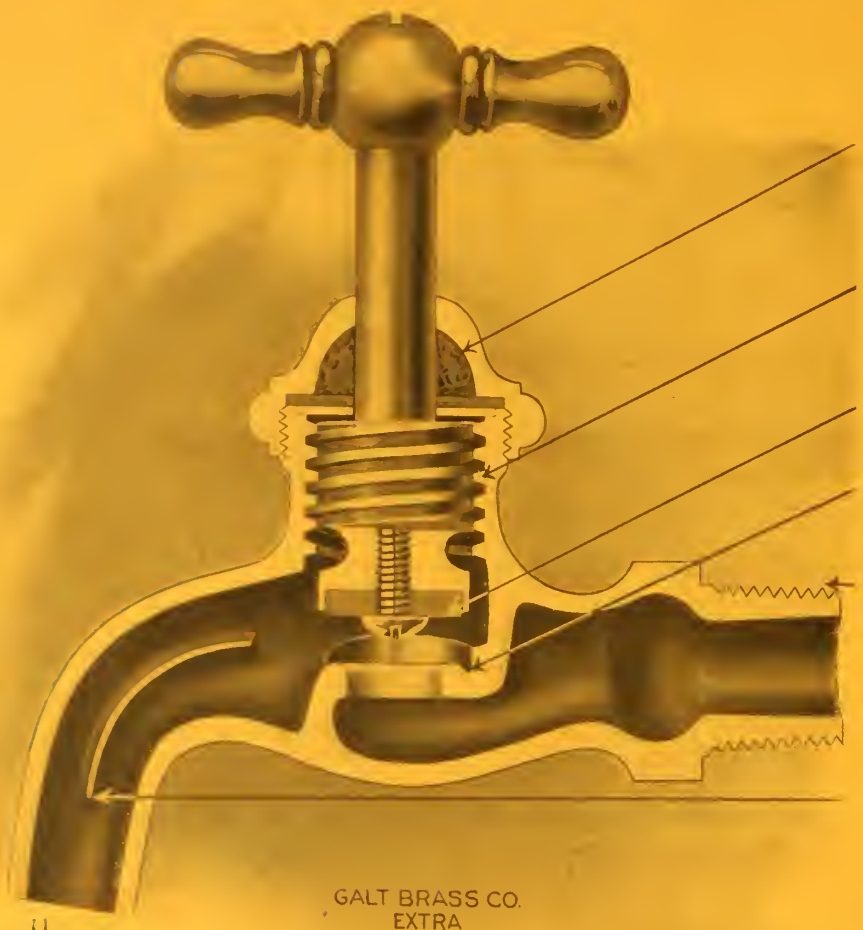

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Published for the Benefit of Prospective Purchasers who are unable to Make Personal Selections of their Plumbing Fixtures.

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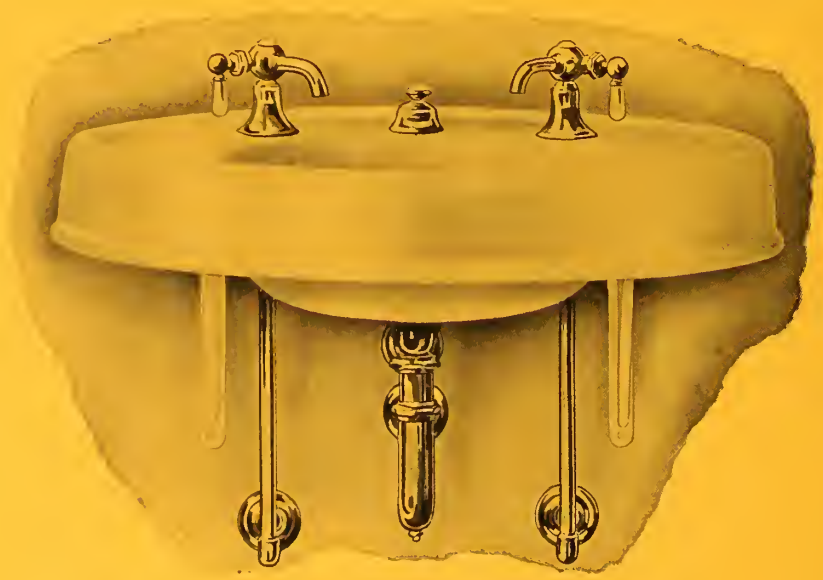

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Capacity, 1" to 2", inclusive, Right or Left. Ratchet allows threading to be done in ditches or positions close to walls or ceilings. Leading screw completely enclosed, excluding chips and dirt.

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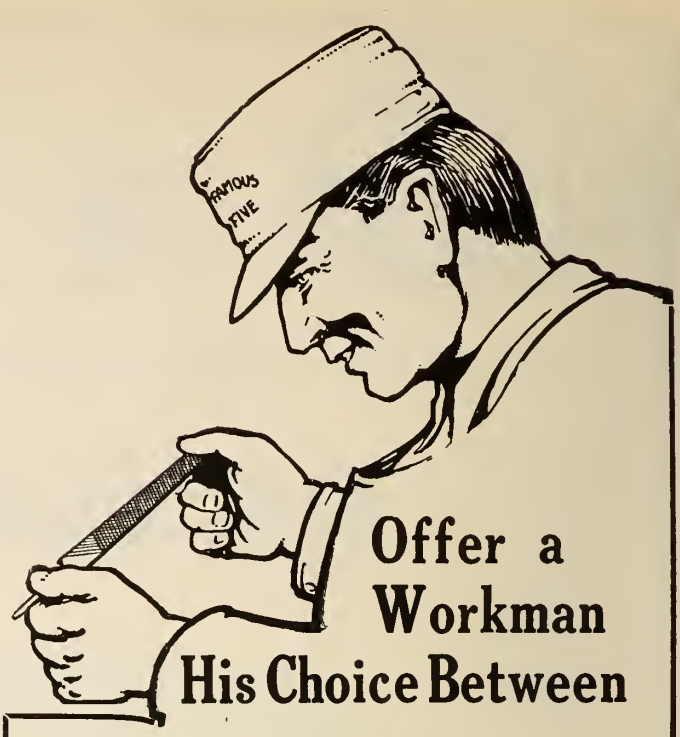

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Why?

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And the saving in time and labor pays for the cost of a file, many, many times over.

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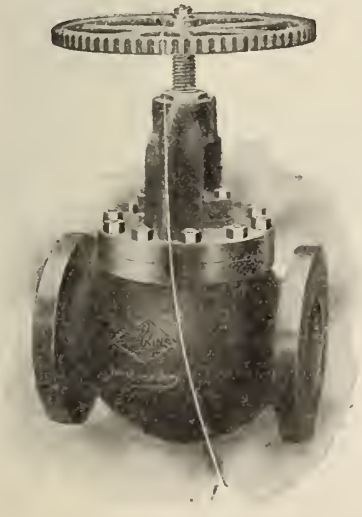

Fig. 162

Made to give the longest possible, satisfactory service under high pressure.

The design is very heavy, strength and rigidity being maintained throughout.

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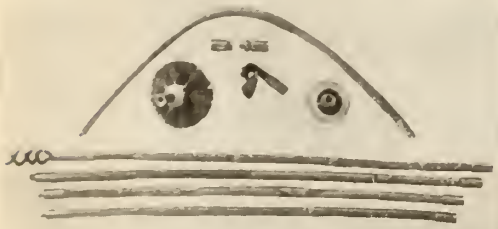

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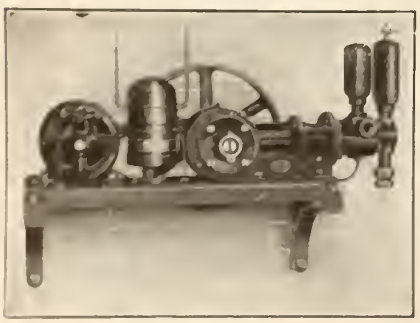

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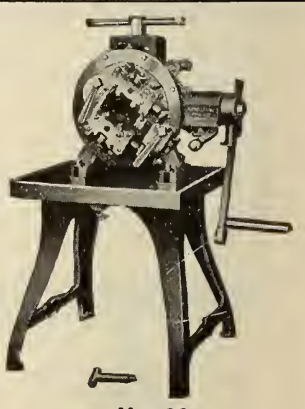

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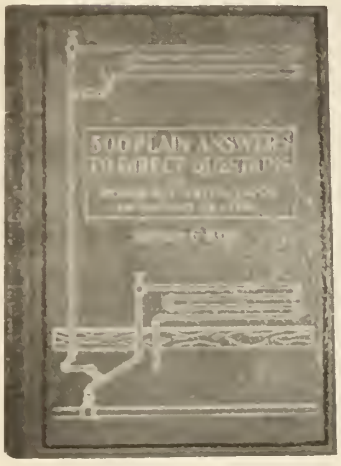

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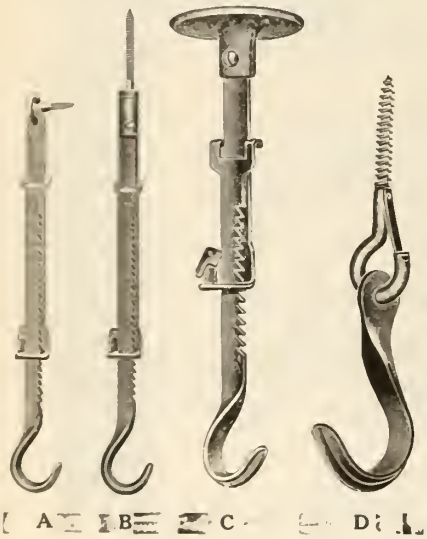

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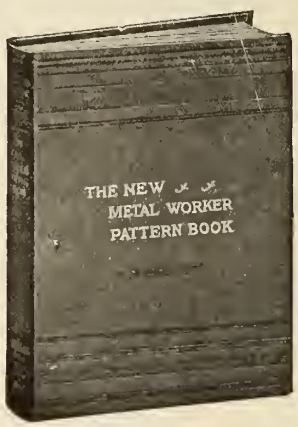

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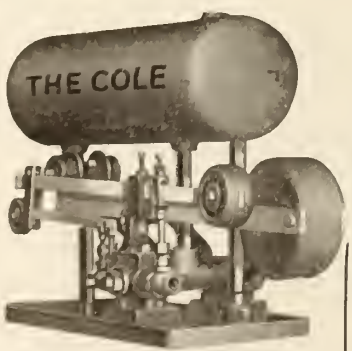

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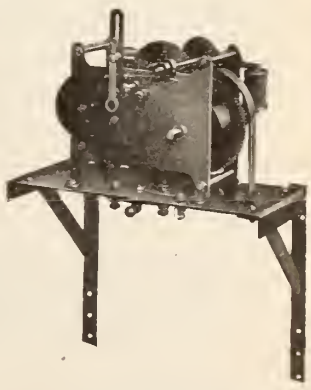

Spring Motor
with Cover Removed

Honeywell Heating Specialty Co.

WABASH - - - - INDIANA

Manufacturers of High-Grade Temperature Regulators

SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, NOVEMBER 15, 1915 No. 22

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EDITORIALS

Bookkeeping and Criminal Code—True Competition—Our Future Ahead—Object of Advertising—Editorial Notes.

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THE SANITARY ENGINEER

VOL. IX. NOVEMBER 15, 1915 No. 22

Heating and Ventilation of the New Methodist Book Room, Toronto

One of the Most Up-to Date Heating Systems on this Continent—Boilers, Radiation, Fans and other Ventilating Machinery Described—Only Part of a Proposed Ten Storey Structure.

THE Methodist Book and Publishing House now occupying the new Wesley Buildings, Toronto, was established 86 years ago. The concern took form in 1829 when Egerton Ryerson was appointed to establish a religious newspaper, with a capital of less than $2,000 subscribed by members of the Methodist Church in Canada. The first building occupied was in Court Street, but in 1839 a move was made to larger premises in King Street East, adjoining what is now the Street Railway Chambers. During the next fifty years the business continued to flourish, and in 1888 a property was purchased in Richmond street for $30,000, and in addition $30,000 was spent in remodeling the existing structure and in making extensions.

Latterly another move became necessary owing to the expansion of the business, and a site bounded by Queen, Richmond and John streets was purchased and a handsome building erected thereon. The old building has not been abandoned entirely, part of it still being used, although it is the intention of the executive to dispose of the old property when a favorable opportunity presents itself. The brief historical sketch explains the progress made by the organization, which is due in no small measure to the executive ability of Dr. William Briggs, the Book Steward, who has been in charge of the Institution for the past 36 years.

The new "Book Room," as it is more familiarly called, has a frontage of 230 feet on Queen and Richmond streets and 220 feet on John street. The structure is of steel and concrete throughout and is faced with grey glazed terra cotta giving the exterior a very fine appearance and in keeping with the nature of the business. The foundations were carried down to bed rock and the steel work designed to carry ten storeys. At present only five storeys have been completed, the other five to be erected when required. The building is fireproof throughout, and is divided into three sections, any two of which become automatically isolated in the event of fire breaking out in the third section. In this connection there is installed an alarm system and standpipes, which will be described later. Burke, Horwood & White, Toronto, were the architects, and the John H. Parker Canadian, Ltd., Toronto, the general contractors.

New Methodist Book Room, Toronto

The power plant occupies the subbasement, and is a complete unit, although for the present some power is being taken from the Toronto Hydro-Electric System, purchase being made on a maximum load basis. The plant comprises a boiler room, pump room, engine room, etc. The rooms are all of ample size, allowance having been made for the installation of additional units when the necessity arises. For the same reason all the main pipe lines, such as those for the heating and water services, were installed with the ten-storey building in view. With this arrangement practically no change will be required in the piping layout when the time comes to complete the structure. It might be stated that this idea has been carried out throughout the entire plant.

Building Layout

In the basement is the engineer's office and maintenance department, the latter comprising a machine and carpenter's shop, stores, etc. In this department

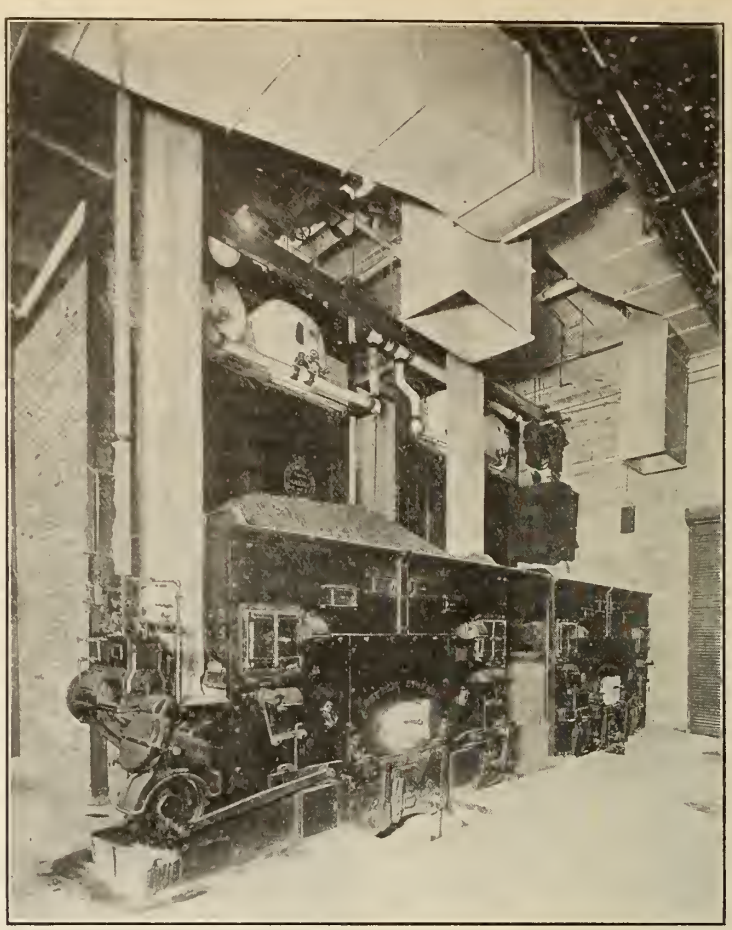
are employed a staff of mechanics, electricians, sanitary engineers, etc., all under the supervision of A. H. Kirby, the chief engineer. The staff takes in hand all repairs to the building, power and printing plants. It may be of interest to note that the maintenance department moved the entire plant to the new premises. In the store room are kept duplicates of all the more important parts of the various machines, presses, etc. The paper cellar is also in the basement, as are also the employees' cloakrooms, the latter being mechanically ventilated. The ground floor on the Queen street front is occupied by the Book Room retail department and stores for rental, some of these being already let. The shipping and receiving department, and the press room are on this floor. The press room has an area of 25,000 sq. ft. and contains 35 presses all driven by individual motors.

On the second floor is the wholesale book department and the bindery, the latter being the same size as the press room. The executive offices are on the third floor, as are also one composing room, stereotyping and electrotyping departments. On the fourth floor is another composing room and the linotype machines. A suite of connexional offices is on this floor and also an employees cafeteria where meals can be obtained at cost price. On the fifth floor are the connexional offices relative to the Methodist Church. The editorial rooms are also on this floor.

Boiler Room

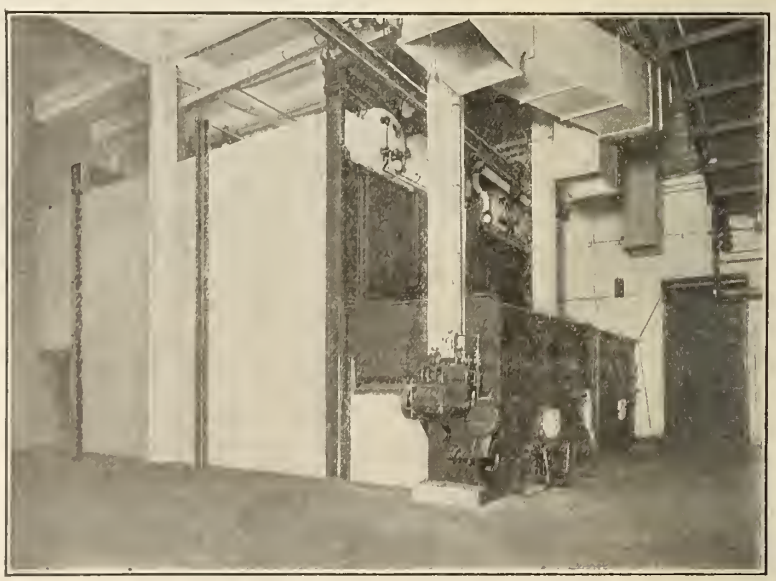
The floors of the various rooms comprising the power plant are at different levels, the lowest being the boiler room, which is 36 feet below the street level. There are two boilers installed, but provision has been made for two further units. The boilers are of the water tube type and were built by the Goldie & McCulloch Co., Galt, Ont. They have "Dutch Oven" furnaces, are set singly and are equipped with "Detroit" stokers.

Each boiler is rated at 300 h.p. and has approximately 3200 sq. ft. of heating surface, and two steam drums 36 in. diameter. They are of the sectional type with staggered headers made of wrought steel throughout for a working pressure of 200 pounds per square inch under Province of Ontario Inspection Rules. They are operated at a pressure of 150 pounds per sq. inch. The stoker equipment was manufactured and installed by the Detroit Co., Detroit, Mich. The stokers, two in number, are of the side feed inclined grate type with their coal magazines extending on each side the full width of the grates. The "Dutch Oven" extends out 8 feet and has coal bunkers on top, each having a capacity of 4 tons.



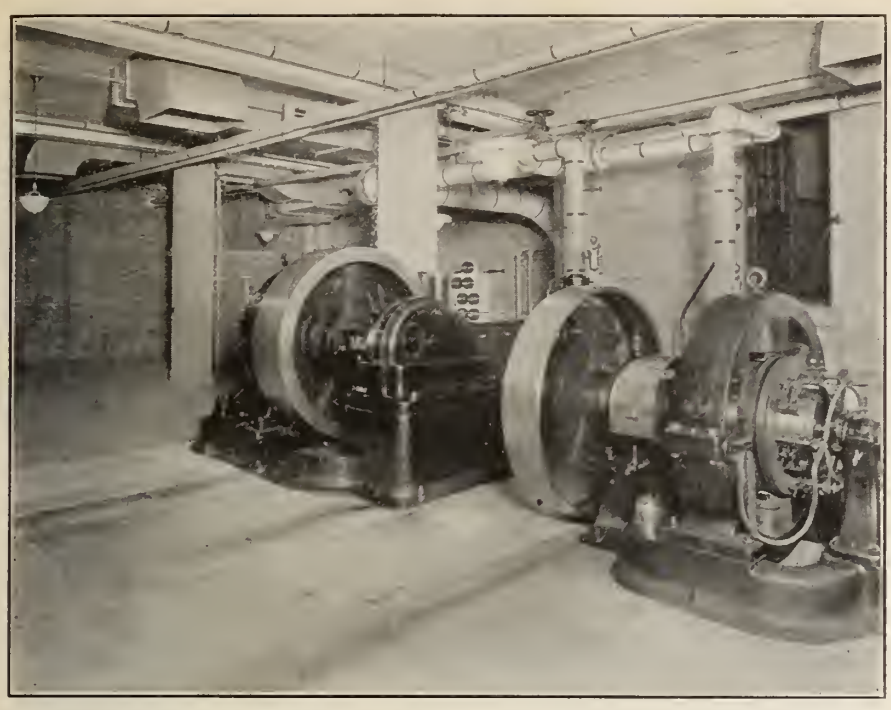
Battery of Two 300 Horse-power Water Tube Boilers

The coal bunkers are provided for by placing coal fender side plates on each side of the stoker directly on top of the magazines, and the coal is fed by gravity from the coal bunkers down through the magazines and on to the grates. The stokers have projected grate area of 50 sq. ft., and are operated by fully enclosed double cylinder, adjustable speed, self oiling engines. The grates are inclined and each alternate one is a vibrator which tends to keep the fuel bed sliced and actuates the movement of fuel downward until it reaches the clinker crusher at the bottom of the stoker.



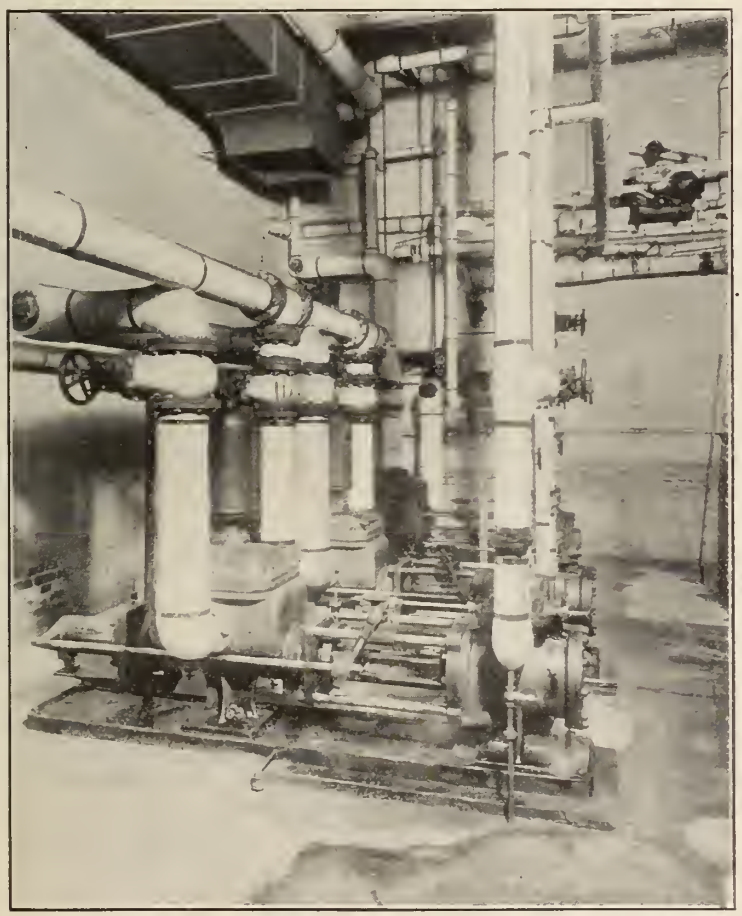
Another View of Boiler Room

The clinker and refuse are ground through revolving clinker crushers and are deposited in the ash pit below. The



Engine Room Showing Two Steam Engines and Generators

stoker is entirely automatic but can be operated by hand in case of accident, eliminating thereby the necessity of shutting down of the boiler or plant. Under each grate is a hopper for collecting the ashes and conveying them into trucks placed under the spout. When full, the trucks are run along to a hydraulic plunger elevator and lifted up to the street level and the ashes dumped into carts. The ash hoist is operated by city pressure and was supplied by A. B. See Elevator Co., Ltd., Montreal. In the ashpit is installed a small plunger pump for drawing out of the sump any water or seepage that may collect.



Pump Room Showing Boiler Feed and Vacuum Pumps

A conveyor system is installed for moving the coal from the bunker adjoining the boiler room to the top of the furnaces. An overhead monorail runs from the bunker to the boilers and carries an electric hoist having 4 h.p. hoisting motor, and a 2 h.p. motor for the traverse. The coal bucket is of the bottom dump type and has a capacity of 1,500 pounds. The coal is weighed by an ingenious method. A section of the monorail just outside of the coal bunker is floating and is connected by means of a system of levers to a "Fairbanks" scale on the boiler room floor. As the hoist with the bucket passes this section the weight is recorded on the scale, the bucket being then carried along to the furnaces. The electric hoist and the conveyor system were installed by W. D. Beath, Toronto.

The boilers are blown into a tank situated high up in the boiler room which condenses any steam that passes over. A damper regulator supplied by Attwood & Morrill, Salem, Mass., is fitted to each boiler. The main steam line to the engine room is 12 in. diameter and is of wrought iron with welded steel flanges. All the high pressure steam piping is of wrought iron with steel flanges, and is covered with 85 p.c. magnesia. The superheat steam lines are covered with sponge felt and the low pressure lines with J. M. T. asbestos cell covering. The cold water mains have anti-sweat covering and the boilers are covered with 85 p.c. magnesia blockwork. All the pipe covering was supplied by the Canadian H. W. Johns-Manville Co., Toronto. Lunkenheimer valves are fitted in the high pressure steam lines and "Jenkins" valves in for the low pressure mains. The various valves in the boiler room are located near the top and are reached by means of a stairway and platform, making all easily accessible for the engineers. The smoke stack is 7 ft. 6 in. diameter and 125 feet high. It is made of steel plate lined with "Vitribestos," supplied by the Canadian H. W. Johns-Manville Co. The boiler room has a telephone communication with the engineer's office and other parts of the building. There is also an electric bell for notifying the engineer when anyone wishes to gain admittance to the premises. This system is only in operation after 6 p.m. when the street doors are locked.

Engine Room

The engine room floor is at a somewhat higher level than the boiler room. There are at present only two units installed, but ample provision has been made for additional power. One of these

is a "Goldie & McCulloch" horizontal high-speed, centre crank, enclosed engine having a cylinder 10½ in. diameter by 10-in. stroke and running at 330 r.p.m. It is direct connected to a 30 k.w. 2-wire generator, 125 volts, d.c. The larger unit is a "Robb-Armstrong" horizontal, high-speed, enclosed engine having a cylinder 13 in. diameter by 14 in. stroke and running at 275 r.p.m. It is direct connected on the same base plate to a "Canadian Westinghouse" 63 k.w. 3-wire generator of 250-125 volts, d.c.

A connection with the city water main is made in the engine room and in the house main is fitted a "Mueller" sand trap. The water then passes through a "Crown" meter which registers the quantity of water used in the building only. The boiler plant has a separate service. In another section of the engine room is installed the gauge board which has the following gauges mounted:—One steam pressure gauge for each boiler, an 8-day clock, a combined vacuum and pressure gauge for the heating system, a city water pressure gauge, and a steam pressure recording apparatus. The gauges have 10-in. dials and were supplied by the James Morrison Brass Mfg. Co., Toronto.

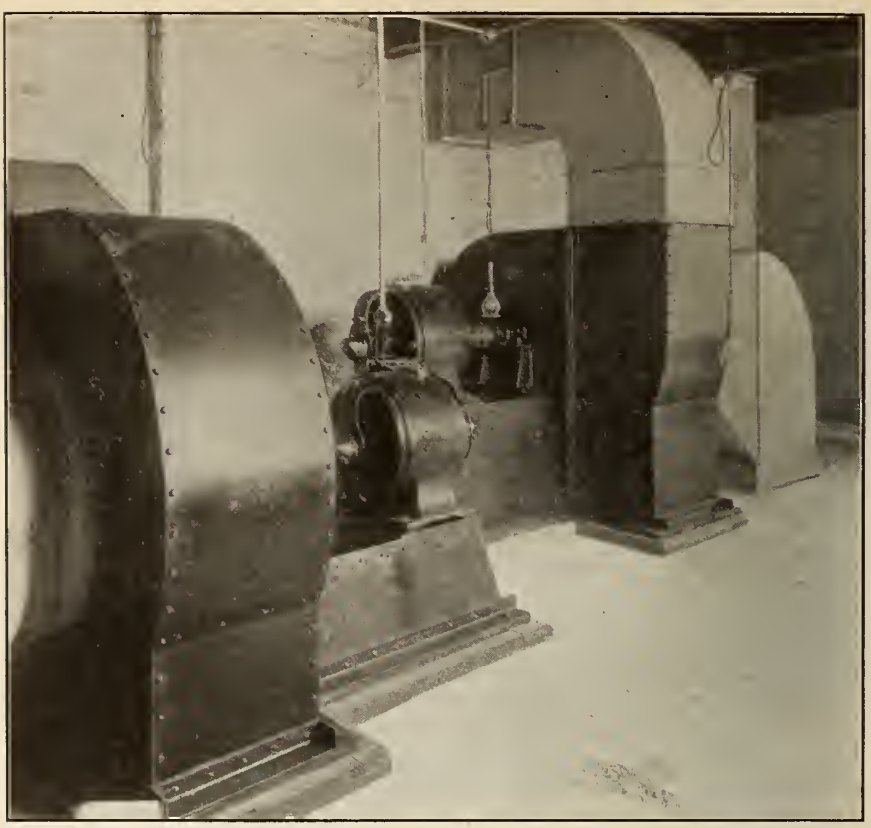
Electrical Equipment

It has been already stated that some power is obtained from the Toronto Hydro System in addition to that generated in the plant. On account of this, the switchboard was designed to take care of both or either load, and is fitted with double-throw switches. The main switchboard was supplied by the Northern Electric Co., Montreal. It has eight white marble panels, two of these being generator panels fitted with ammeters; a potential indicator and "Westinghouse" circuit breaker; d.c. volt meters are located at the side of these panels. The other panels are fitted with double-throw switches controlling various circuits, and there are also four automatic circuit breakers. The incoming current is measured by two "Sangamo" d.c. watt-hour meters.

Behind the switchboard is a tunnel leading north and south under the floor. All cables are laid in conduits, and there are two systems of electrical distribution for the north and south sections of the building respectively. A motor generator set is installed in the engine room for charging two storage batteries in connection with call bells, telephone system, time clocks, elevator signals, etc. This unit was supplied by the Holtzer-Cabot Electrical Co., Boston Mass., and consist of a 1½-h.p. generator, 230 volts, d.c., running at 1,750 r.p.m. The switchboard in connection with this unit has two ammeters, a voltmeter and switches.

All the motors installed in the building are direct current machines. In the press room and bindery the presses and other machines have individual motor drives. The motors in the press room are of "Sprague" and "Westinghouse" make, and are compound wound, variable speed, remote control printing press equipments.

There are 135 motors in the printing plant alone, varying from ⅛-h.p. to 10-h.p., and having a total of 580-h.p. Other motors installed will be referred to individually in connection with the purpose for which they are used.



Exhaust Fans in Centre Pent House

Pumping Plant

The pump room is situated near the boiler room on a slightly higher level. Here are installed the boiler feed and vacuum pumps, heater for the house hot water service and ventilating fan. The two boiler feed pumps are 12-7-12 inch simplex horizontal plunger type, and were made by Darling Bros., Montreal. In connection with the heating system is installed a "Burnham" 12 11-16-inch vacuum pump with a tank above for collecting the returns. The normal condition is for the feed pumps to pump the condensate from the vacuum tank to the boiler. The piping, however, is arranged so that in case of emergency water can be pumped direct from the cold water main to the boiler, while an alternative arrangement provides for the cold water going to the tank and being heated before being pumped to the boiler.

A "Reilly" filter is fitted in the boiler feed line for extracting grease or other impurities from the feed water. The filter has duplicate screens, so that it can be operated continuously. The condensate from all the steam lines is collected in a "Pratt & Cady" tilting trap and returned to the boilers. A "Sims" exhaust steam heater, having a capacity of 850 gallons, is installed in the pump room for the purpose of providing hot water for the house lavatories. This apparatus is heated by exhaust steam, and is fitted with a temperature control device, supplied by the Canadian Powers Regulator Co., Toronto. On a platform in the pump room is located a motor-driven fan for ventilating the power plant.

Sump Pumps

Under the engine room and on the same level as the pump room is installed some auxiliary equipment, and provision has also been made for future plant additions. There is a separate connection with the city main for the boiler feed in this room, a "Mueller" sand trap being fitted in the line. All fresh water from the city main passes through a 6-inch "Worthington" water meter located here. By this means the exact amount of water evaporated in the boiler is known. All condensate is, of course, returned to the boiler, and as will be described later, the system is arranged so that fresh water can be admitted into the feed line when required.

The exhaust main, which is 14 in. diameter, passes through this room. This pipe is larger than necessary for present requirements, but was made this

size in view of future needs. The exhaust steam passes through a grease extractor, and in connection with this appliance is a "Darling Bros." centrifugal pump, directly connected to a "Sprague" ¾-h.p. motor, d.c., running at 2,000 r.p.m. Nearby is a sump, 18 feet deep, for collecting drains, seepage, etc. In the sump are installed two centrifugal pumps, each having a capacity of 400 gallons per minute. The capacity of these pumps is sufficient to handle a large quantity of water in the event of a water main breaking. Each pump is direct connected to a 5-h.p. motor, running at 1,500 revolutions per minute. The equipment is fitted with a float and automatic starter, and so arranged that the second pump will begin to operate if the load becomes too heavy for the first. The pumps were supplied by the Yeomans Bros.' Pumping Machinery Co., Chicago, Ill., and the motors by the American Rotary Valve Co., Chicago. A shower bath, with hot and cold water, is installed in this room for the benefit of the firemen.

Maintenance Department

The engineer's office is located in the basement. Adjoining office is the machine shop equipped for making all necessary repairs for the entire plant. In addition to the lathes and drill presses there is installed a machine for sharpening paper cutting knives, supplied by the Seybold Machine Co., Dayton, Ohio. This shop constitutes the headquarters of the maintenance department which includes a staff of electricians, machinists, carpenters, sanitary engineers, painters, etc. In this respect the plant is entirely self-supporting, no outside help being required for making repairs and keeping the plant in working order. The machine shop equipment is driven by a 10-h.p. "Westinghouse" d.c. motor. Near the machine shop is a stock room for spare motor and machine parts, including spares for the presses.

Heating and Ventilating System

The building is heated throughout by means of radiators and exhaust steam on the vacuum system. In the size and arrangement of the steam lines provision has been made for a ten-storey building. The radiators are of "Gurney" make and are fitted with "Dunham" thermostatic traps. Provision has been made for installing a thermostat control system at some future date. The heating system is laid out so that the building can be heated by means of live steam direct from the boilers. A reducing valve is fitted in the line near the boilers. In mild weather the exhaust steam from the engine is sufficient, but when the weather becomes colder the valve is opened, permitting live steam to enter the system at a pressure of about 2½ lbs., which can be reduced to ½ lb. if necessary. In cold weather the valve is always open.

The ventilating system consists of three multivane fans of special width for exhausting air from the lavatories, smoke room, lockers, type casting room, etc., and one fan for ventilating the boiler, engine and pump rooms, etc. There is one exhaust fan for the lavatories in the north wing of the building. This fan has a capacity of 2,200 cu. ft., and is direct connected to a 1½-h.p. motor running at 260 r.p.m. In the central pent house are two fans, one for exhausting air from the lavatories in the other parts of the building and the cloak rooms, and the other for ventilating the smoke room and type-casting room. The first mentioned fan has a capacity of 6,800 cub. ft., and is driven by a 5-h.p. motor running at 260 r.p.m. The second has a capacity of 9,000 cub. ft., and is driven by a 5 h.p. motor running at 240 r.p.m. The fan for ventilating the boiler room and engine rooms, etc., has a capacity of 2,000 cub. ft., and is driven by a 6 h.p. motor running at 225 r.p.m. All the fans are of the "Keith" type and were supplied by Sheldons, Ltd., Galt. The motors are d.c., ohm wound machines, and were all supplied by the Canadian General Electric Co., Toronto. The heating, plumbing and ventilating contract was carried out by Bennett & Wright, Toronto.

PACKING OF PARCELS FOR SOLDIERS AT THE FRONT

The public is urged to exercise every care in packing parcels for the troops, as careful packing is absolutely essential to ensure delivery of the parcels in good order.

Parcels sent abroad require a higher standard of packing than is necessary in the Canadian parcel post, and this applies with even greater force to parcels for the troops. Those which are inadequately packed run great risk of damage or loss of contents.

Thin cardboard boxes, such as shoe boxes, and thin wooden boxes, should not be used; nor does a single sheet of ordinary brown paper afford sufficient protection. The following forms of packing are recommended:

1.—Strong double cardboard boxes, preferably those made of corrugated cardboard, and having lids which completely enclose the sides of the boxes.

2.—Strong wooden boxes.

3.—Several folds of stout packing paper.

4.—Additional security is afforded by an outer covering of linen, calico or canvas, which should be securely sewn up.

The address of the parcel should be written in ink on the cover preferably in two places.

The address of the sender of the parcel should also be stated in order that it may be returned if undeliverable. The contents of the parcel should be stated in writing on the cover.

In the case of parcels sent to the Mediterranean Force, they should be very strongly packed. They should be as nearly round as possible, and well padded with shavings, crumpled paper, or similar protective material. The outer covering should consist of strong linen, calico or canvas, and should be securely sewn up. The use of wooden or metal boxes with square corners is undesirable, as parcels so packed are liable to injure other parcels in transit. No perishable articles should be sent, and anything likely to become soft or sticky, such as chocolates, should be enclosed in tins. Parcels merely wrapped in paper or packed in thin cardboard boxes, such as shoe boxes, cannot be accepted.

Post Office Dept., Ottawa.

NO SEWAGE TO BE EMPTIED INTO NEW YORK CITY WATER

After a controversy extending over several months, the State authorities of New York have decided to empty the sewage from the Mohansic State Hospital and the Yorktown Training School for Boys into the Hudson River instead of into Mohansic Lake, one of the sources of New York City's water supply.

Experts claim that the mingling of this sewage with the water supply would in no way endanger the city's water supply, because it would be subjected to screening, sedimentation, filtration and disinfection. The effluent would be a clear, colorless, sterile fluid upon reaching Mohansic Lake, and would be further purified in its flow of twelve miles before reaching Croton Lake, where it would be again purified by sedimentation. The final sterilization at the intake of the city's water supply would be the last step in removing any germs which might remain.

Despite these assurances, the city authorities were not satisfied, and very recently it was decided to empty the effluent into the Hudson River.

NEW INCORPORATIONS

The Steel and Radiation, Ltd., has been incorporated at Ottawa with a capital of $5,000,000, to manufacture iron, steel and other metals and to carry on the business of an engineering and construction company, at Toronto. Incorporators: James Stellar Lovell, Robert Gowans and John Joseph Dashwood.

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NOVEMBER 15, 1915

BOOKKEEPING AND CRIMINAL CODE

LAST week a Toronto merchant was up for trial on a charge of not having kept books as required by the Criminal Code of Canada. The merchant commenced business in August, 1914, and later operated three stores in Toronto. In June, 1915, the merchant made an assignment for the benefit of his creditors under such circumstances as to raise in the minds of the officers of the Canadian Credit Men's Association a suspicion that he had not acted honestly with his creditors. His trade liabilities amounted to more than $75,000 at this time and there was a considerable deficit shown by the statement prepared by the assignee. The Canadian Credit Men's Association handled the estate and decided to prosecute the merchant under the section of the Criminal Code which requires a retail merchant to produce books of account, in case of insolvency.

This section reads as follows:

"417. Every one is guilty of an indictable offence and liable to a fine of eight hundred dollars and to one year's imprisonment who, being a trader and indebted to an amount exceeding one thousand dollars, is unable to pay his creditors in full and has not for five years next before such inability kept such books of account as according to the usual course of any trade or business in which he may have been engaged, are necessary to exhibit or explain his transactions, unless he be able to account for his losses to the satisfaction of the court or judge and to show that the absence of such books was not intended to defraud his creditors." The important part of this section is the five year clause.

This is ambiguous for it may mean that a trader must be in business for five years before he is required to keep books or it may mean that a trader may destroy his books which have to do with business prior to the five-year period next before his insolvency. The latter, of course, is the intention of Parliament in passing the section but the merchant in question relied on the technical interpretation that as he had only been in business for nine months the section did not apply to him at all.

The Judge who heard the case disagreed with the interpretation placed upon the section by the merchant's counsel, and found the merchant guilty but consented to reserve sentence until the Appellate Division of the Supreme Court could be asked for an interpretation of the section. This will be done in December.

It will be noticed that it is not a criminal offence for a trader to do business without books but it is a crime to become insolvent and not be able to produce books. Further it should be noticed that if books are not produced the trader must be able to explain his transactions to the satisfaction of his creditors.

TRUE COMPETITION

THE above article is interesting in more than one way. If a merchant in whatever line he be engaged does not keep a set of books, he is almost bound to develop into an unfair competitor. It is hardly possible for him to avoid giving away other people's or else his own goods, his time, or his employees' labor. The latter, of course, is paid for, but it is a dead loss either to the employer or to his creditors. To conduct a business in such a way and without true regard to cost is against all business principles, and cannot fail to create a suspicion in the public's mind. A case in point happened a few days ago. Two of our craft sent in tenders on some work. One was actually 10 per cent. lower than the other could buy the goods for—a plain proof that something was wrong. The incident caused the person requiring the work done to feel that one of the party was trying to "put one over on him," when in actual fact it was the very reverse.

It would be a splendid thing if the purchaser of goods at less than cost could be made to pay the difference in case the party selling the goods became insolvent. There is an undercurrent of suspicion in the

minds of the public at large that the charges of this trade are exorbitant, and 90 per cent. of this suspicion is created because of the great variation in the figures quoted on certain work. In practically every case these figures would be found to be the result of a bad system of bookkeeping.

OUR FUTURE AHEAD

ON another page there appears a very interesting article under the heading of "Sanitary Science Course." The article deals with typhoid fever, its origin and how it can be prevented.

No craftsman can play so important a part in the prevention of the typhoid scourge as can the sanitary engineer. It is a preventible disease, and has its origin in the unclean habits and customs of one or more individuals. That animal, the human being is responsible for it, and it is he who suffers most from the disease. "Now, how can sanitary engineers prevent it?" you will no doubt ask. A few weeks ago the writer called upon several members of the craft and was discussing this very question. It seems that during the summer just past, a certain member of the trade tendered on several plumbing installations for some country residences. The builder was a retired farmer. The tenders submitted called for septic tanks, etc., but the tenders for plumbing installations were to be quoted separately, as also were the tenders for the septic tanks.

The tender for the plumbing was accepted, but the sanitary engineer was informed that the septic tanks were going to be dispensed with on account of the cost, the builder being instructed to build three old style cesspools.

Then came along the builder with a request that the sanitary engineer connect the plumbing to the cesspool. Upon the sanitary engineer demurring and stating that cesspools were unsanitary and that the septic tank was the only proper as well as sanitary method to adopt, the builder began to rail and rave, calling him a rogue and every other uncomplimentary name he could think of; and he is now holding the account up until he gets someone else to connect the plumbing to the cesspool, on the plea that no proper test can be made on the plumbing till it can be operated.

Here is a question of very vital importance to the whole trade, and particularly so on account of the amount of country work being done at present. There is one stand to take on all such questions, and that is for every sanitary engineer to refuse to install any plumbing if that plumbing is going to be used in such a way that the sewage from it will pollute either a waterway, stream, lake or even the ground.

There is a future to think about and we are building for the future. Our work is constructed to last a lifetime. Therefore, we should preserve our integrity, we should demand that a proper disposal plant be installed, or else refuse to do the work. Can we conscientiously look a person in the face if we have been guilty of installing a cesspool for fear of either losing business or not making sufficient profit on a job? The fact is, we are the chief custodians of the public's health, and if we fight the good fight, stick to our high ideals, and stamp all cesspools or inferior goods of any kind out of existence, the public will not be long ere they begin to realize that the old-time plumber is long past dead and that the sanitary engineer has come to more worthily fill his place.

It is too vital a question to be dealt with from a mere dollar-and-cents standpoint.

OBJECT OF ADVERTISING

MANY business firms will be doing or using to-morrow what they refuse to do or use to-day. It is not that the to-morrow thing is not good to use or do to-day, but rather that the perception of its worth is beyond the present-day vision of the man with whom decisions rest.

To-morrow, for example, many a business firm will be using dictaphones and addressing machines, to mention but two things which many are refusing to-day to instal. The need for these devices in their business is as great to-day as it will be to-morrow. The obstacle in the way of their immediate installation is in a great majority of instances an obtuse human being. Time—frequently much time—is required to open the eyes of sleeping men.

One of the burdens or objects of advertising is to awaken sleepers—to arouse them from a smug content, from intellectual torpor, and from physical and mental laziness. So long as humanity lasts there is likely to be a resistance to new ideas and suggestions, and the overcoming of this resistance will be an unavoidable obligation on those with something to sell.

EDITORIAL NOTES

KEEN COMPETITION may be the *life* of trade, but in the sanitary and heating trade it may be the death of thousands and can easily result in the ill health of a whole city.

* * *

WHO WOULD care to see the crape on the door of a home at which he had done a poor plumbing job.

* * *

THEN DON'T buy or instal poor goods. No one can do a good job with inferior material and poor workmanship.

* * *

LOW GRADE goods may result in the death of one's customer as well as one's own reputation.

* * *

TO BE ABLE to buy good goods one must know good goods, and to know the difference between a good and poor line one must read, mark, learn and inwardly digest all he can about his business.

Sanitary Installations for Farm and Dairy

A Description of Farm and Dairy Installations Which Will Prove of Interest and Mean Business to Sanitary and Heating Engineers—Country and Farm Homes Can be Equipped for Less Actual Cost Than Those in the City

Second Articles of the Series.

ONE of the chief necessities of farm life is that of good light. Most farms and villages in Canada have to be contented with coal oil lamps, though not a few have electric lighting, in which instances the appliances described below would not be of interest.

To form some idea of the necessity of lighting by some other means than by coal oil lamps, one has only to read the daily newspapers. Scarcely a day passes but we read of some farm or rural home being destroyed by fire and in many cases, lives lost.

There is also another point of great importance, which interests the sanitary and heating engineer, and this is the cooking appliances in such a home, particularly in summer. Hot water, too, is just as necessary, if not more so, in summer than in winter, and to obtain plenty of hot water on a farm or in a rural residence, the range, either wood or coal, has to be put into use.

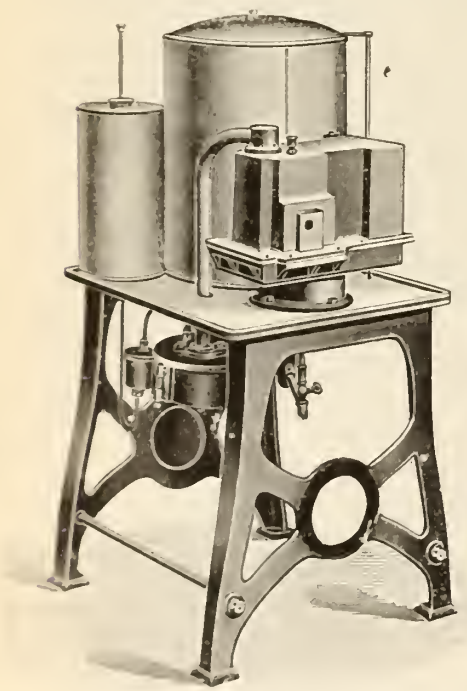


Fig. 1.—New Gas Plant.

Those who live in city homes would feel it very much if they could not use a gas stove or gas water heater in summer. City homes would become almost unbearable; in fact, the very thought of having to light up a cooking range in summer for either cooking or heating water in a city home is almost out of the question. Having admitted these facts, we must see what can be done to furnish the farm or rural home with apparatus which will take the place of electricity and coal oil lamp.

To-day there are quite a number of gas-making appliances which can be installed in such districts as have neither gas nor electricity.

One of these contrivances is shown in this article. This particular machine can be installed at a very reasonable cost and in various sizes from 20 lights upwards; and where installed it is not only possible to use the ordinary gas range, but also the ordinary gas water heater. It can also be used for heating up the furnace instead of coal. The same system of piping as used for the regular city home is adopted. Thus it will be seen how easy it is for the sanitary and heating engineer to also become the lighting engineer. Quite a large number of those engaged in the trade are devoting a lot of time to electric installations and are finding the business very profitable indeed. But, as stated before, there must be available electric current. Whereas the private gas plant, which can be run economically, would fill a long-felt want. Fig. 1 shows a machine which will generate and give off a gas suitable for heating as well as lighting at a very reasonable cost. We are told it will generate 500 cubic feet of gas from one gallon of gasoline. Such being the case, it can easily be seen that the cost of maintenance for fuel would be very reasonable. Placing the cost of gasoline even as high as 25c per gallon, gas at approximately 50 cents per thousand cubic feet would be even lower in price than in most cities.

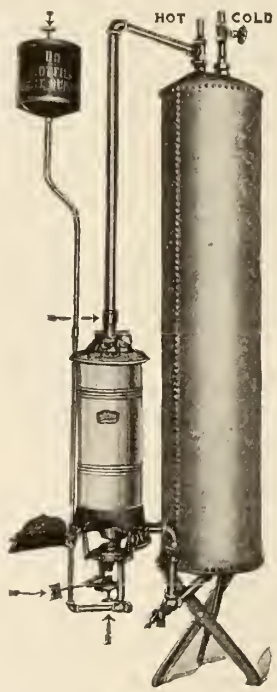


Fig. 2.—Gasoline water heater, perfectly safe. Specially built for localities where no gas can be had.

There are quite a large number of locations in the Western Provinces which have enormous quantities of natural gas going to waste at this very moment which gas could be well utilized on the farm and in country districts where mains laid from the gas borings pass through such districts.

The next interesting appliance which, if pushed as it should be, would be a boon to the farmer as well as a profitable line for the sanitary engineer, is that of the gasoline water heater shown in Fig. 2. It has proved to be both safe, economical and effective, and will do all that is necessary.

Of course there are quite a number of people who have their doubts as to the safety of gasoline, and it is the duty of the sanitary and heating engineer to disabuse their minds.

For instance, there are thousands of farmers using coal oil lamps which take toll every year in fires as well as life. At the same time, there are hundreds of farmers who handle dynamite without the least fear, for blowing up roots, rocks, etc., and never think that dynamite is far more dangerous to handle than gasoline. Yet those same farmers would be almost scared to death at the thought of having gasolwine in their homes.

It is all a matter of education, and the sanitary and heating engineer can do much along this line. Once get a gas plant or a gasoline water heater installed in any district, taking good care to see that those who are to use the appliance know how to operate it, and confidence is at once established. There is profit to be made in all such missionary work amongst the residents of a rural district. There are almost unlimited possibilities to do splendid business with the farmer and rural resident.

Getting After New Business

Sanitary and Heating Engineers in Large Towns and Cities are "Seeking" and "Finding" Business—Becoming Better Salesmen Every Day—Quite a Large Number are Realizing an Improvement in Their Business.

Seventh Article of this Series.

IN previous articles under the above heading, various methods have been described by which new business has been gotten by the sanitary and heating engineers. Different advertisements, which have been inserted in the various local newspapers, have been mentioned and suggestions of advertisements have been shown, many of which have been utilized by our readers. It is some little satisfaction to the writer of these articles to know that where such suggestions have been either partly or wholly adopted, business has resulted which otherwise would not have materialized.

The illustration below gives another kind of advertisement which is bringing grist to the mill of the sanitary and heating engineer. Almost every manufacturer is doing his utmost to create new outlets for the products of his factory, and manufacturers of heating apparatus are no exception to the rule.

It is a well-known fact that city work is almost at a standstill; yet the output of some of the factories which make such goods as are handled by this trade is by no means a negligible quantity. This has come about by manufacturers using advertisements in local papers, or by the trade going after the farmers and residents in rural districts. One of our readers lately asserted that had he not gone after the country trade a year or so ago he would have had to shut up shop ere this.

Now the reason we reproduce in this issue a fac-simile of a manufacturer's advertisement is to show our readers what manufacturers are actually doing to assist sanitary and heating engineers in their efforts to dig up new business. This advertisement appeared in a farm paper which has a very wide circulation, and it cannot fail to arouse especial interest in heating appliances.

The next step to good advertising is the personal touch, and, knowing that the farmer is being shown, by means of advertisements of this kind, how he can enjoy good health, greater comfort and convenience, the sanitary engineer should follow up this advertisement with a personal call upon any likely prospects in his neighborhood. He can directly benefit by such advertising, no doubt; but some additional personal effort on his part is required in order that business may result.

Another point which should not be forgotten is that every man in the trade should endeavor to become thoroughly conversant with the various lines of goods on the market which are used in his business. Take boilers for instance. He should know all the most vital talking points of every boiler on the market, and when a farmer calls into the store or shop and asks for particulars about a certain boiler, he should be able to explain almost all that's worth knowing and in the end make a sale.

The writer happened to call at a place some time ago, when in walked a farmer and asked for particulars regarding a certain boiler. It seems this farmer had heard from a friend of his living in a city that he (the farmer) could have a hot water heating furnace installed in his house, and recommended a particular make of boiler.

The heating engineer started off by saying that he was agent of a much superior furnace than the one named, and began to claim one thing after another for the furnace he sold, at the same time giving the furnace inquired about a "black eye."

The result was that the farmer became quite undecided as to the advisability of having a hot water furnace installed at all, and replied that he had no idea that there was so much to learn about a furnace before one knew just exactly which was the best to buy, and concluded by saying that his folk had been used to stoves for so long that "he guessed he wouldn't bother."

This is an actual incident, similar no doubt to many, which may be happening all over the country. It should not be the case, and would not if every heating engineer would make it his business to become familiar with every furnace on the market. He should be ready to sell any furnace asked for, and particularly those which are being advertised in his trade paper at regular intervals. It is just as important a matter to study the advertisements of a trade paper as it is to read the editorial pages; both are necessary to the well-being of the readers. Every advertisement gives the reader some kind of information, and is bound to call to mind some line of goods which are either out of stock or are likely to be called for. Many advertisements will suggest new ways of getting after new business.

Why live this way—misery!
Being miserable
in the winter months on the farm doesn't come one cent cheaper than being comfortable.
Farmers who put in Gurney-Oxford Hot Water Heating wouldn't take $500 and go back to the old way of trying to heat by stoves. They save in doctor's bills; they don't get old and rheumatic before their time; they don't lose the boys and girls and the hired help to the city, because the farm home is as comfortless as a barn for five months in the year. Now, don't laugh it off or say you'll do it next year—the time to consider putting in Gurney-Oxford Hot Water Heating is now.
Hot Water Heating does not dry out the air.
Gurney-Oxford Hot Water Heating
We say it takes very little carpentry or bother or time to put a Gurney-Oxford Boiler in the cellar, and the necessary pipes and radiators throughout the house. We say the whole cost is very low—lower than many a farmer puts into a good horse and buggy or a motor car. Now, if this is so—you can afford Gurney-Oxford Hot Water Heating, can't you? You certainly want it, don't you? Then before you decide not to install it—at least get our new booklet, "City Comfort for Country Homes," and find out just what heating your home by hot water means, and what it costs (less than running two stoves).
The Gurney-Oxford "Economizer" enables you to keep the fire always under perfect control, so that the temperature agrees with the weather out doors. If the mercury drops below zero, the heat goes up; if there is a thaw or mild spell, the heat goes down. This "Economizer" is patented and is exclusive to Gurney-Oxford goods.
Remember, no "water system" is needed with the Gurney-Oxford Boiler—a few pails of water put into the radiators and pipes in the fall lasts until spring. The boiler burns either coal or wood as you may select. It gives you a beautiful, even, natural September-day warmth in every room in the house. Write for the booklet, "City Comfort for Country Homes," to-day. Address
Gurney Foundry Co., Ltd 502-550 W. King St. Toronto
(Also at Montreal, Hamilton, Winnipeg, Calgary, Edmonton, Lethbridge, Vancouver)
This is the way—comfort!

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

Article 16.

Typhoid Fever

AS pointed out in a previous article, of water borne diseases, typhoid fever is the infectious disease with which sanitary engineers are mostly concerned. Commenting upon health conditions in Canada a few years ago, a prominent health officer said:

"As far as I know there has never been a new settlement started in Canada which has not paid its penalty in lives, in suffering, and expense from an epidemic of typhoid, a disease, more amenable than any we know of, to the direct control of an active town council and health board by the adoption and enforcement of up-to-date methods of disposing of excreta and supplying good water."

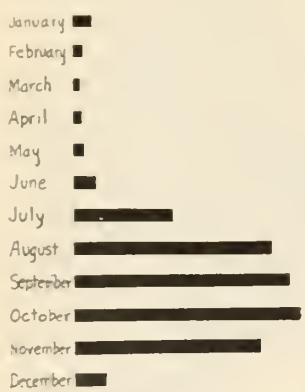


Fig. 40

Transmissible diseases that are communicated through the agency or medium of air, water, food or clothing are termed infectious as contrasted to contagious diseases that are transmissible by contact with individuals suffering from the disease. While typhoid fever may generally be classed as an infectious disease, it is also, under certain conditions, contagious.

Typhoid fever is essentially an intestinal disease, and is hence also termed enteric fever. The typhoid bacillus (see Fig. 38) generally enters into the body through the mouth, and finds its way into the intestines, where, if unchecked, it multiplies rapidly, and millions of typhoid bacilli may then be evacuated in the urine and faeces. In article 2 of this series, in the issue of April 15th, 1915, the different types of bacteria were described and the characteristics of the bacillus type of bacteria given.

If the defences of the body are not strong enough to combat these typhoid bacteria, the disease shows itself in most cases in about two weeks after infection. This "period of incubation" (see article 5, June 1st, 1915) may vary, however, from nine days to three weeks, depending no doubt on the number of the bacilli swallowed. After this period of incubation the typhoid bacilli are found in any fluids of the body. The doctor recognizes the disease by the patient's symptoms and an examination of the blood will also show it.

Typhoid is generally more prevalent during the late summer and early autumn, though epidemics may occur at any time. In article 13 it was explained that in the autumn typhoid fever might be more prevalent because the copious rainfalls wash the surface impurities and bacteria down to deeper strata from which drinking water may be drawn. Fig. 40 illustrates in an approximate manner an average distribution of typhoid fever throughout the year.

A water supply polluted by excreta from typhoid patients is the usual way in which the disease is transmitted. Other manners of transmission are ice, milk or food containing typhoid bacteria, and, chief of all, probably, the "house fly," which might well be called the "typhoid fly."

It has, the writer believes, been satisfactorily proven that insanitary conditions, such as lack of drainage, defective plumbing, open cesspools, sewer gas, decaying animal and vegetable matter, cannot in themselves cause typhoid fever. It is held that such conditions predispose a person to the disease, but the typhoid bacillus must be actually present in the patient to cause the disease. This information is given because there is frequently a popular opinion to the contrary, and probably all of us have a "feeling" that insanitary conditions directly cause disease. Such a feeling is not far wrong, for, while insanitary conditions cannot alone directly cause typhoid or any other bacteria disease, they certainly make it possible for disease bacteria to thrive, and these bacteria in one way or another infect us.

Most bacteria are not harmed by freezing, and typhoid bacilli will remain alive in ice for several months in "cold storage;" they are found in the particles of dirt often seen in ice .

Typhoid bacilli grow well in milk, which may become infected if the milkman washes his cans with infected water. Milk cases should be well washed with water which has been sterilized by boiling. Cases are known where this has been done, but subsequently the cans were foolishly rinsed out with cold water from a source later proved to be infected. Unnecessary carelessness with milk supplies has been the cause of more than one typhoid epidemic. Flies that have come in contact with typhoid

Fig. 38

discharges often carry bacteria to milk which they next visit.

Uncooked food may become infected by being washed in polluted water, and flies infect uncooked or cooked foods in the same manner as they do milk. Oysters and shell fish from polluted waters may also cause the disease.

Healthy persons attending typhoid patients should observe every precaution in handling the patients' discharges. Otherwise actual contact becomes a means of transmitting the disease. The attendant's hands become infected, and may infect vessels and dishes containing milk or food.

Typhoid bacilli will live a long time in the soil. Discharges from typhoid patients have contaminated wells and streams by being thrown on the ground, the bacteria evidently draining with the surface water into the supply of drinking water. Even if thrown out in winter, the bacteria can remain in a frozen state till the spring, and may then contaminate the water supply.

After a person has become infected with typhoid he must be left in the

doctor's care, but it is the duty of the sanitary engineer to prevent, if possible, the disease being contracted in the first place, or further outbreaks when the source of infection is known. We have already discussed the matter of preventing pollution of wells. Care should always be taken to have the privy pit removed as far as possible from the well and at a lower level. Even when septic tanks are operated and the sewage disposed in the ground by tiles, no unnecessary risks should be taken, and the land used for such a purpose should be as remote as possible from wells in the vicinity.

When the source of supply is suspected, only distilled or boiled water should be used for drinking or other domestic purposes. Milk, if suspected, should be brought to the boiling point; if boiled it is not relished by most people. Thorough cooking of food, it should be noted, will destroy all typhoid bacilli.

As previously mentioned, the house fly is one of the means of spreading typhoid fever. It has been described as one of the most dangerous pests with which civilization is afflicted. But it is largely or entirely our own fault, as it is due to insanitary conditions over which we have, or should have, control.

The breeding place of the fly is generally in filth or the manure pile. A fly hatches and becomes full grown in about ten days. It then alternates between manure piles, privies and other filthy matters on the one hand, and food supplies on the other, carrying disease bacteria on its legs from the former to be deposited on food.

Precautions to be taken against flies might be enumerated as follows:

1. In the spring manure piles should be removed and the surroundings disinfected with chloride of lime or other disinfectant.

2. In the summer, manure should be removed daily or kept in a closed bin.

3. Garbage cans when emptied should be cleaned out thoroughly and disinfected with boiling water or chloride of lime.

4. Yards should be kept clear of decaying animal or vegetable matter.

5. All doors and windows of houses should be screened.

If the flies gain an entrance into the house they should immediately be attacked with fly swatters, sticky flypaper or fly poison.

To prevent the spread of typhoid, the discharges from a typhoid patient should be caught in a vessel and treated for not less than an hour with boiling water or chemicals like carbolic acid or bichloride of mercury. Even after sterilizing, the discharges should never be thrown on the ground, but put in a trench and covered with quicklime and earth to at least a depth of two feet from the surface.

For many weeks, and in some cases months, after the patient has recovered he still carries around numerous typhoid bacilli, which are discharged in the faeces and urine. It is estimated that about 25 per cent. of typhoid patients carry the bacteria for one year. Also some people are so slightly sick with typhoid that the disease is not recognized, although, of course, the discharges are a source of infection. About one per cent. of typhoid patients, though themselves immune from further illness, carry and discharge typhoid bacilli all their lives. All these carriers of typhoid infection, whether it be temporary or permanent, are a source of danger to the commuity. "Typhoid Mary," a cook in New York, caused the death of a number of her assistants before it was discovered that she was a typhoid "carrier." The papers recently cited a similar case in Ontario.

The sanitary engineer should do all in his power to prevent any community or individual from polluting any source of drinking water with sewage. Sewage can, on a large or small scale, be satisfactorily purified and no expense should be spared in such a case. Further, he should advocate the installation of a proper system of filtration of public water supplies. Household filters will be the subject of a future article, but it might be noted here that many of them are useless; even worse than useless, in that they give the user a false sense of security. Milk should be regularly inspected, and all sanitary precautions taken on the farm and in the dairy.

Fig. 38 shows how typhoid bacilli look under the microscope. They have been stained, as mentioned in article 6 (June 15th, 1915), so that the flagella can be seen. In Fig. 39 are shown a few colonies of typhoid bacilli grown at room temperature (20 degrees Centigrade, or 68 degrees Fahrenheit) for three days. In each of these colonies there are probably millions of bacteria (see article 2, April 15th, 1915).

In article 5 (June 1st, 1915) it was noted that in the intestines there are ordinarily millions and millions of bacteria. It is difficult in examination to isolate the typhoid bacillus from among these, especially as the colon bacillus (B. coli communis), which is always present in the intestines, increases greatly in numbers when the patient is suffering from typhoid. It becomes more difficult and practically impossible to discover typhoid bacilli in sewage, as the faeces and urine containing them are then diluted. Hence if sewage-polluted water were tested for the presence of typhoid bacilli they would almost certainly not be discovered. The colon bacillus is, however, always present in

(Continued on page 28.)

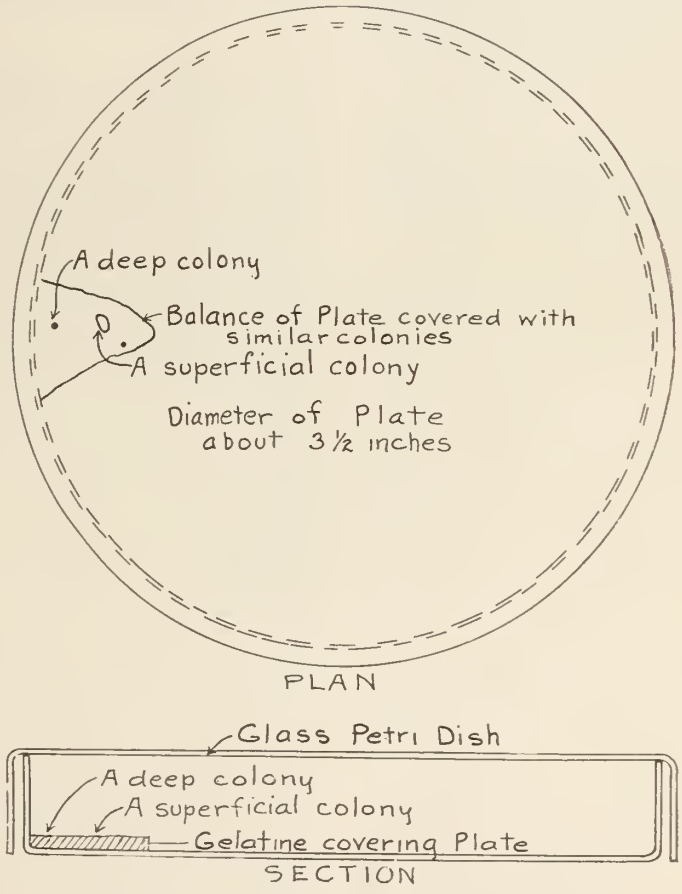


Fig. 39

Notes on Automatic Sprinklers

A Line Which, If Given a Little Special Study, Could Easily be Handled by Sanitary and Heating Engineers.

By R. O. Wynne-Roberts, Temple Building, Toronto.

IN an editorial in a recent issue of The Sanitary Engineer a reference was made to the possibility of extending business operations, and one of the possibilities mentioned was that of installing fire protection equipment. So a few words on automatic sprinklers may be acceptable to readers of Sanitary Engineer. The writer has for some years taken an interest in matters associated in the means for protecting buildings against fire.

In Canada and the United States the losses caused by fire are enormous. The financial burden due to these losses must directly or indirectly, be borne by the customers. Of course, the fire insurance companies have first to bear the loss, but they do not exist as philanthropic institutions; they are operating for profit and, therefore, pass on the burden by imposing rates which will cover the losses plus something for profit. The business man again lives for profit; he is not there for health or pleasure, but for gain, so if he has high rates of insurance to pay, he simply has to include it in his charges for services and materials. Therefore, in the end the innocent customers have to pay.

Moreover, the social dislocation caused by fires inflicts an indirect loss on the community. People are thrown out of work, and it takes some time for them to find other jobs; meanwhile they are not producing wealth, but are losing wealth, and somebody suffers. But no one can suffer without others bearing a share of it, and again the loss is borne by the people. Consequently, anything your readers can do to reduce the losses by fire will result in better conditions both for themselves and for their customers.

The subject of fire equipment is one that will require volumes to discuss—e.g., private hydrants and hose connections, tanks, sprinklers, drenchers, etc., so that in this article reference will be made to sprinklers only. During the past thirty years about 500 patents were taken out in the United States for sprinklers and allied appliances, but today the number of makers of sprinklers which give satisfaction number about a dozen.

The first sprinkler was probably that of Ambrose Godfrey, England, 1723, which utilized a cask holding an extinguishing solution and a pewter vessel containing gunpowder which, on explosion, scattered the fluid. The first automatic sprinkler head was made by Harrison, London, in 1864. The best known sprinkler head is that made by Grinnell, who produced his first make in 1882. Since then all sorts of sprinklers have been suggested, patented and made, but only a few have survived the practical test of long experience.

Sir Isaac Newton in 1699 found that certain alloys had a lower melting point than the constituent metals employed. Barnabas Wood, in 1860, produced an alloy, which is practically the one used to-day. The accompanying table will give the information concerning Newton's and Wood's mixture and melting points:

Metal	Newton	Wood	Melting Point of Metals.
Bis	5 parts	4 parts	600° F.
Lead	3 parts	2 parts	504° F.
Tin	2 parts	1 part	421° F.
Cad		1 part	476° F.
Melting point of alloys			212° F. 165° F.

The bulk of the sprinkler heads have solder made of alloy that melts at about 165° F., where higher temperatures must be provided for, such as in boiler or furnace rooms, the alloy is made up of different proportions of the metals so that it will melt at a higher temperature. It is found that in time the solder is affected, and that the valves tend to stick, so that they will not open instantly, but the number of failures in this respect is exceedingly small. Fumes act on the heads, but it is possible to prevent this by coating them with a certain kind of wax.

As already stated, it will take volumes to write fully on this subject, but it is possible to deal with it in a popular manner, if required. The point which will doubtless appeal to the trade is the possibility of utilizing the sprinkler system for heating purposes as well. It will be readily seen that if this scheme is feasible the sanitary engineers who install hot water fittings would find a new line of business as pointed out. It is strange that sprinkler systems have not been utilized as auxiliary heating systems, so that in very cold weather they could be made to give additional heat required. This was done by Parmalee—one of the pioneers in sprinkler developments—for he, in 1872, in this manner found extra heat for a New Haven factory. The same combined arrangement was carried out in a cotton mill at New Bedford, also in Lewiston, Cambridge, etc.

If the solder melts at 165° F., and hot water heating pipes have a temperature of 180° F., or thereabouts, then one would expect the solder to melt and water to be discharged at the sprinkler head. The precaution is a simple one—namely, to insert a tee piece in the distributing pipes with opening on top, in which is fixed a nipple and elbow about twelve inches of pipe and a sprinkler head. This side arm is set at right angles to the distributing pipe, and, as there is no circulating water in it, this arm keeps cool and the solder does not melt, but the sprinkler system is ready for extinguishing fire, and at the same time can be used as a secondary heating plant. Some modification in pipe and valve arrangements are necessary, as those familiar with hot water installations know.

The economy of such a combined arrangement is said to mean a saving of about 33 per cent., which is worth considering. The writer must acknowledge that much of the foregoing information is derived from a study of Mr. Graham Dana's book on Automatic Sprinklers, which may be seen at the Public Libraries, as well as data collected from other sources during the past few years.

MONEL METAL may be forged by heating it to a temperature of from 600 to 900 deg. C., or from 1,112 deg. to 1,652 deg. F. It is preferable to heat the metal in a muffle furnace, although it can be done in a gas or oil-fired furnace where a neutral or slightly oxidizing flame nearly free from sulphur is maintained. It is important in forging work that there should be the least possible loss of time in the handling when the metal is withdrawn from the furnace, as Monel metal loses its heat very quickly.

Practical Course for Sheet Metal Workers

ARTICLE No. 25 OF SERIES

By CHARLES SEIVERS

Article 25.

IN this article are shown the principles upon which the patterns for a cone-shaped flashing is developed. Whatever pitch the roof may be the same method is adopted.

The first step to take is to determine the exact slope of the flashing, carrying the base of the cone below the actual pitch of the roof. The next step is to find out the size of pipe for which the flashing is required, and also the size of the cone at its base. The best way to do this is to make an outline drawing as shown by all the solid lines.

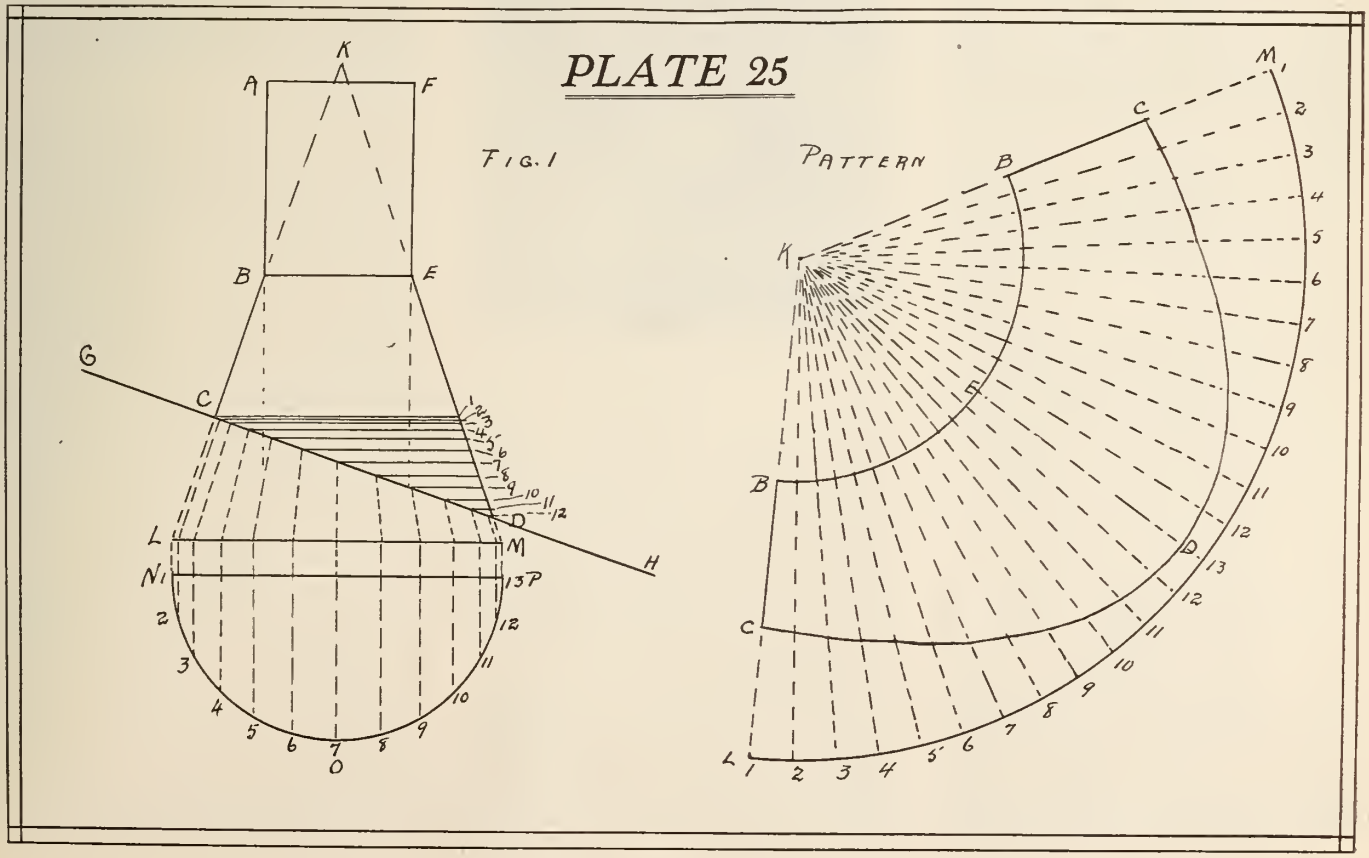
At A-B-C-D-E-F is shown the elevation of a pipe passing through a sloped roof G-H. The problem in this case is the development of the cone flange around the pipe and fitting on the roof as shown by B-C-D-E. To complete the view of cone extend the sides B-C and D-E to their apex at K. The base of which can be drawn parallel to B-E from the point D or any convenient point below as L-M, extending the two sides until they intersect base line. On this base line or one parallel to it draw a half section of bottom of cone as N-O-P.

Divide this half section into any number of equal parts as shown by 1, 2, 3, 4, etc. At right angles to N-P draw lines from each of these points extending them until they intersect the base line L-M. From each of these points on the line L-M, draw a line to K intersecting the line G-H, from each of these points on G-H draw a line parallel to L-M, intersecting the side E-D.

To develop the pattern. K-M in Fig. 1, as a radius, draw an arc, from K draw a line to intersect the arc as shown at K-M. Fig. 2. From M transfer the spaces shown on half section N. P. O, in Fig. 1, repeating to complete circumference.

From each of these points draw a line to the centre K. This will outline pattern of cone K-L-M at Fig. 1, to obtain the part B-E C-D, with the compasses measure the distance K-E-D in Fig. 1, and with these as a radius and K as the centre draw an arc through pattern of cone as shown by B-E-B, Fig. 2. As the base of part required is not parallel to base L-M, the different radii are obtained by the intersection of the lines drawn from G-H with the side of cone between E-D. With K-1 as radius draw a small arc on line K-1 of pattern obtaining point C as shown. With K-2 as a radius draw a small arc intersecting line K-2 in pattern, proceed in the same manner with K-3-K-4, etc., as radii, and intersecting lines K-3-K-4, etc., in pattern. A line drawn through these intersections on the pattern completes outline of pattern of the cone flange as shown by B-E-B and C-D-C in Fig. 2. It must be noted that no allowance for seam is allowed. This should be done by extending the pattern Fig. 2 on each edge shown at B-C, B-C.

The longer the pointed portion of a shell and the shorter the cylindrical portion, the less the air resistance.



GOSSIP OF THE TRADE

WINNIPEG NEWS BOX

We Mourn

We regret to record the death on the 2nd instant of Geo. Frazer, of the Frazer Plumbing Co., one of the leading men in the business, and a member of the Sanitary Committee of the local Sanitary and Heating Engineers' Association. The late Mr. Fraser was a big hearted energetic member of the trade and will be greatly missed in the councils of the local association and by his many friends.

A Splendid and Commendable Move

The city is installing plumbing this year in a greater number of houses than usual, at the instance of the owners who are entirely working people unable at this time to afford to do the work themselves. The costs are charged against the property as taxes and spread over a period of seven years. Over 40 installations of this kind have been made this year.

Sanitary Appliances for Our Soldier Boys

Temporary plumbing has been installed at the various drill halls and other buildings occupied by the troops throughout the city. The general principle of this plumbing was designed on request of the military authorities last year by the Plumbing and Sewer Department in collaboration with Mr. C. D. Kirk, who made the first installation at the Horse Show Building, which has proved very effective. It consists of syphonic action range closets and urinals and properly trapped ablution tables.

An Interesting Lecture on Plumbing, Past and Present

At the weekly meeting of the local Health Inspectors' Association, Mr. Jas. Smith, chief plumbing inspector lectured on "Plumbing, Past and Present," and emphasized the necessity of thorough ventilation of a plumbing system if it was to have a long and useful career. The lecture was illustrated with a large number of exhibits showing the deteriorating effects of sewer or drain air on lead, brass and cast iron.

Doing Their Bit for Us All

Five employees of the Plumbing and Sewer Department are now on active service, and six others are actively drilling with local military organizations.

WITH THE MANUFACTURERS

It is an acknowledged fact that there are very few good all-around general rubber goods men in Canada or United States, and J. A. Wade, of Canadian Consolidated Rubber Co., Ltd., Montreal, is one of them. His recent appointment as factory manager of the general rubber goods section of the Montreal mill will, therefore, be thoroughly appreciated by all who buy rubber goods, because of the fact that it means better service and better value to the customers of this particular company.

J. A. WADE

No man is born with a knowledge of general rubber goods; he has to acquire it. And he can only acquire it by long years of actual contact with the goods themselves, and by familiarizing himself with their manifold uses and with the conditions under which they are called upon to serve.

Twenty years of daily contact with hose and jar-rings, belting and washers, packing and tank floats, and all kinds of gaskets, and the thousand-and-one other items that enter the line, are behind Mr. Wade. And he has not wasted his time.

Mr. Wade entered the employ of the Revere Rubber Co., Chelsea, Mass., in 1895, and spent four years receiving a practical training in the factory. He was then transferred to the sales division, to become familiar with costs, selling, and general office routine. After serving in this capacity about four years, he went on the road as salesman, selling general rubber goods.

Hearing of the proposed changes that were at that time contemplated at the plant of the Canadian Rubber Co., of Montreal, he made arrangements to join their staff, and was appointed assistant manager of the mechanical rubber goods division.

Aside from the two years, 1912 and 1913, which he spent with the B. & R. Rubber Co. as general superintendent of factory, he has always been connected with the mechanical line.

Mr. Wade not only knows his goods and their uses, but he also has the happy faculty of handling well the human element in a factory organization. Superintendents, foremen, and the help generally, feel that they are safe in his hands—that he will give them a "square deal." They also know that he won't tolerate lax and slip-shod methods, and they respect him accordingly.

NEW BOOKLET

The D. W. Meyers Co., Lancaster, Pa., have recently issued to the trade a very interesting book describing the Meyers Steam Heater. This is a small heater which may be connected to a steam line from which it derives heat for heating hot water for domestic purposes. Full particulars may be had by writing to the firm above named, and procuring one of these books.

Analysis of Canadian Plumbing Bylaws

Proposed New Plumbing By-law for Montreal—Many Clauses Not Only Ridiculous, But Impracticable, Proving That Sanitary Engineers Should be Consulted in Such Matters—The Sanitary Engineer Takes Full Responsibility for the Criticism Published in This Series of Articles.

ARTICLE 6

THE next section to take up in continuing these comments is 646, followed by 647, 648 and 649, all of which deal with the draining of decks or roofs.

Deck Drains

Section 646.—All decks and light-wells shall be properly drained, trapped and vented, and be connected into a sewer, drain pipe, soil pipe, waste pipe or down pipe.

Decks Twelve Feet (12 ft.)

Section 647.—Decks located on the outside boundaries of a building and not exceeding twelve (12) square feet of superficial area, need not be drained and connected as defined in the last preceding section.

Deck Traps

Section 648.—A trap shall be placed as close as practicable to the deck served. Several decks may be drained into the inlet side of one deck trap which shall be vented. All deck traps shall be placed in such a location as to be safe from frost and shall be supplied with water from the nearest suitable fixture. It is forbidden to allow the effluent from a water closet or a urinal to act as a feed for any deck trap.

Deck Clean-outs

Section 649.—Clean-outs shall be provided on the sewer side of the trap serving a deck and shall be made accessible.

Section 646 is practically cancelled by Section 647. The two might have been embodied in one clause, though the matter of placing traps on a roof rain-water leader is rather questionable. Why should there be any trap on such a pipe? We fail to see any use for it. There would be far more reason in suggesting that all rain-water leaders used to drain water from roofs or decks should be fitted with a well-constructed hopper, and in showing a design of hopper which would be allowed.

No doubt these hoppers should be fitted with a secure wire or perforated metal strainer, the latter for preference, which should be made of heavy sheet copper. As regards venting, we do not agree with this, simply because we do not see any need for a trap in any case. For the same reason we see no need of Section 647.

Of course there may arise certain isolated conditions which would warrant the use of a trap, but in such a case, the power to order it should be vested in the chief inspector of plumbing.

Over-flows

Section 650.—Every over-flow from a bath, basin, tank or other fixture shall be drained by a special pipe of lead or galvanized wrought iron of a diameter not less than one inch (1 in.) bore, and in no case shall it be connected without a trap to any soil, waste, drain, sewer or vent pipe.

Section 650 is somewhat out of order, because it is almost an impossibility to secure a fixture these days with a patent overflow.

The bath waste and overflow is a fixture by itself. Lavatory basins, even though they be the old style, would be easier to connect to the inlet side of a trap than otherwise. Further, we do not think any waste or overflow pipe should be permitted less than 1¼ inches.

Urinals and Closet Overflows or Waste

Section 651.—Urinal and water-closet floor drains may be connected to a main waste, soil or sewer pipe, provided such drains be trapped and vented. It is forbidden to allow the waste from any urinal to act as the feed to any floor drain.

It would seem by this section that urinals and water-closet floor drains need not be either trapped or vented. With this we do not agree, unless, of course, such fixtures are on a top floor. We do think, however, they should at least be trapped and the urinals in particular should be vented. Just imagine an office building with several urinals and w.c. floor drains having no traps on them!

Do the compilers of this by-law think for one moment that a main trap at the building line is sufficient? If they do, why have any traps on any fixtures? The idea is ridiculous.

Closet Tanks, Flushometers

Section 652.—Excepting flushometer closets, all water-closets within a building shall be supplied from separate tanks or cisterns, the water of which shall not be used for any other purpose.

No fault whatever can be found with this section. We believe that every fixture which requires water to flush it, should be furnished with its own tank. It may, however, be permissible to furnish all these separate tanks from one supply tank, particularly in large buildings where on account of height the pressure from the city main may not be sufficient. In such cases a large cistern at the top of a building would be a good thing. This same cistern could be utilized to furnish water for flushometers, the latter being possibly used for either w.c.'s or urinals.

Closets Supply

Section 653. — Excepting flushometer closets, a group of water-closets may be supplied from one tank but water-closets located on different floors shall not be supplied from one tank.

It will be seen that the above section contradicts section 652, in the sentence where it states that "a group of water-closets MAY be supplied from one tank."

Why is there any need for such useless and meaningless repetition? As our readers will plainly see, one section is brought into being, only to be cancelled by the next. A section of much fewer words and to the point would have been of some practical value, such as the following, which is offered as a suggestion, when dealing with the subject of water-closets:

"No water-closet shall be installed in any building unless fitted with either an approved flushometer or tank for the purpose of effectually flushing such w.c. Such flushometers and flush tanks may be supplied with water from either elevated cisterns or direct from city pressure as conditions may warrant, etc., etc."

As for allowing a number of water-closets to be flushed direct from one tank, we do not agree with such a section, the main reason for our objection being that should the tank get out of order, the whole battery of water-closets would be put out of commission. All sanitary fixtures should be separate units in themselves, at least as far as possible in keeping with good practice.

Closet Restrictions

Section 654.—It is forbidden to install pan closets, common hopper closets, flush rim hopper closets, or any other form of closet not automatic in its flushing action or not having a continuous flow of water during period of use.

Closet Flush

Section 655.—When water-closets are supplied from tanks the down or flush pipe to each shall in no case be less than one and one-quarter ($1\frac{1}{4}$ in.) inside diameter.

With section 654 we do not find anything wrong, though it is one which could have been embodied in one or two general sections which could have been compiled to meet all necessary requirements.

In the case of section 655, we think it could be made clearer as well as more up-to-date and practical.

For instance, unless a tank is at least $4\frac{1}{2}$ feet above the flushing rim of a w.c. bowl, $1\frac{1}{4}$ in. pipe would be too small. To be on the safe side we would recommend that no w.c. fitted with a high flushing tank should have a flush pipe less than $1\frac{1}{2}$ inches inside diameter. With low down tanks nothing less than 2 inches diameter should be allowed.

This will be found to be good practice. There certainly should be some definite line drawn as to the size of flush pipe according to the height of the tank.

Closet, Etc., Connections

Section 656.—No rubber connections shall be allowed between water-closets and vent pipes, nor shall any closet be set in plaster or similar substance.

Closet Lead Bend

Section 657.—When a water-closet is connected to the soil pipe and through a lead bend, then the outlet side of the bend shall be properly wiped to a brass ferrule and the ferrule be properly caulked into a receiving hub.

Closet Lead Connections

Section 658.—When a water-closet is not connected to the soil pipe by a lead bend then it may be connected by and through a lead pipe lengthening piece, which shall be properly wiped to a heavy brass ferrule, and the ferrule be properly caulked into a receiving hub.

Closet Flanges, Etc.

Section 659.—When, under the two preceding sections, closets are connected by and through a lead pipe, then suitable brass floor-flanges shall be used. When the closet is connected to either cast iron or galvanized wrought iron and regular brass ferrules, lead pipe and wide joints are not used, then the connections between the closets and the soil pipe shall be made with an approved adjustable and threaded or threaded and caulked floor-flange connections.

(Continued in Next Issue.)

UTILIZING WASTED HEAT

To utilize the heat in waste gases from internal combustion engines is the purpose of a heater recently placed on the market.

It consists of a series of cast iron sections that are built up in number and size, according to the horse-power of the engine to which it is connected.

Passages lead the heat-laden exhaust gases through the sections, which are tightly caulked to one another to prevent the escape of the heat.

The device may be used to heat water for ordinary household purposes, or for producing low pressure steam to a maximum of twenty pounds per square inch.

With such an economizer as described, the waste gases from a ten horse-power engine will give off something like 545 lbs. of water up to boiling point in one

An Economizer

hour. For such an engine the best size of economizer is 18 inches high by 12 inches in diameter.

—Popular Science Monthly.

HYDRAULIC PRESS TO BEND BIG PIPES

A small, but exceedingly powerful, hydraulic press has recently appeared, which has the advantage of being both strong and portable. The accompanying photograph shows the curved platens which press the pipe to any desired curve without buckling it. The operation of the press is controlled by two levers, one of which quickly lowers the plunger until its die meets the pipe,

Hydraulic Press

while the other lever applies the hydraulic pressure.

PRACTICAL SANITARY SCIENCE

(Continued from page 23.)

human faeces, and can be fairly easily detected. Ordinarily there are about 100,000 colon bacilli in a cubic centimetre (less than a teaspoonful) of sewage. Colon bacilli may also originate from animal sources, or from fish or birds, but their presence should be regarded with suspicion, especially in large numbers, as it indicates sewage pollution. It is almost certain, as can be gathered from what has been said about typhoid "carriers," that where there is sewage, there, too, are typhoid bacilli. They can live, it has been found, at least six days in water, in which time they may travel many miles, and no city ever drank water contaminated with sewage that did not suffer from an outbreak of typhoid.

The typhoid and the colon bacilli are so similar in form, size, mobility, and in the way they behave when grown in cultures, that they have in the past been considered by some to be different varieties of the same bacillus. There are, however, some differences which need not concern us here, as no bacteriologist, as a rule, ever tries to isolate the typhoid bacillus in samples of water submitted for examination. He determines, on the contrary, in what quantities the colon bacilli are present. The significance of the number present in certain quantities will be explained in a future article on the bacteriological examination of water.

Just a word in regard to vaccination dealt with in article 5, referred to above. Inoculation with anti-typhoid vaccine is advocated by some as a means of preventing the spread of typhoid. In Canada, the contraction and spread of the disease can be avoided by the observance of the sanitary rules set forth in this article. Sanitation is the natural method of prevention of disease, and in this country, at least, vaccination with its attendant unpleasantness and possible risk can be avoided.

New Sanitary and Heating Goods

ELECTRIC SUMP PUMP

The Canadian Buffalo Forge Co., Berlin, are issuing two very interesting bulletins describing a few of their many lines. Bulletin number 273 gives details of their line of Electric Sump Pumps, and is illustrated with views as well as detailed drawings, along with data.

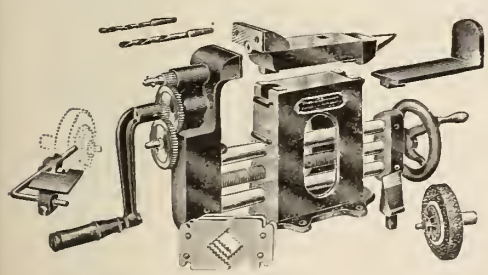
Condensation Return Pump

Bulletin number 274 is also very interesting, particularly to heating engineers, in that it describes their line of condensation return pumps, both steam and electrically driven, the latter a very effective yet simply constructed centrifugal pump, the impellers being very similar in construction to those of the aforementioned sump pumps.

These booklets and further particulars may be procured by writing to the above named company at their head office and factory, Berlin, Ont.

THE STEWART HANDY WORKER

Chicago Flexible Shaft Company, Chicago, Ill., offers to the trade the Stewart handy worker, a combined machine for home workshop, farm workshop or garage. The tool is one which combines several practical working devices in compact form. All that is necessary is to bolt the device to a table or work bench and is ready for use. There is a strong powerful vise, with jaw opening of 4½ inches. The jaws are 4 inches in width, and will hold any wood or metal article firmly and securely. There is a pipe vise which will grip pipe up to 1½ inches in diameter. The anvil is strongly and substantially made, and a steel cutting hardie for cutting wire or steel. There is also a drill-

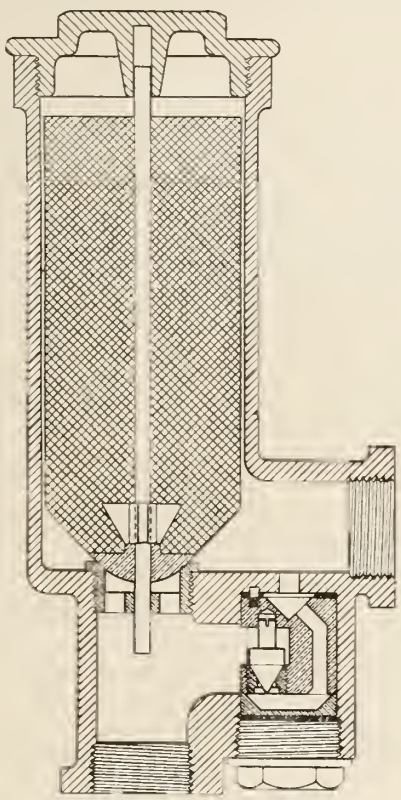


The Stewart Handy Worker

press, which can be operated at two speeds. There are two drills and a rest to hold the job to the drill. There is a corundum grinding wheel that will keep the edges of wood or metal cutting tools, knives, etc., in good shape. The wheel has three speeds—direct, 4 to 1, and 16 to 1. The weight of the complete outfit boxed for shipment, is 90 pounds. A descriptive booklet will be mailed upon request.

NEW HEAT GENERATOR OR BOOSTER

The Clark temperature booster is a device which is said to increase the circulation of the water in hot water heating systems, by putting a pressure on the system. As the water in the boiler starts to warm up, expansion takes place. The weighted valve within the booster is pressed down and retards or prevents the water from rising to the expansion tank so readily. This action results in an increased circulation of the water throughout the system, and as a consequence increased temperature of the water, which in turn increases the temperature of the room. This additional pressure is maintained until the water has sufficient force of expansion to raise the weighted valve within the booster, and allow the water to escape to the expansion tank. When the temperature decreases, the water flows back through the by-pass to the system. The by-pass valve is self-contained, and can readily be removed from the booster by taking out the brass plug at the bottom, when the cage containing the by-pass and its valve is easily removed. The by-pass, as shown in the illustration, has a tight-fitting ground brass seat, which is absolutely tight even against air, and releases very readily under pressure of the returning water. Every part of the by-pass is easy to get at if at any time it requires inspection or cleaning. The stem of the valve seat has a slotted head so that the valve and its seat may be removed and reground at any time. It can be easily fitted to old unsatisfactory hot water heating systems, and will greatly increase their efficiency, thus saving the cost of adding more radiation or a larger-sized boiler, as well as effect a great saving in fuel.



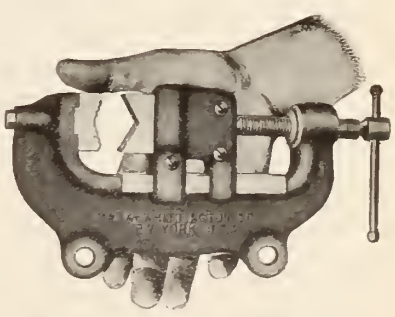
Clark Temperature Booster

Further particulars may be had by writing to W. E. Clark Co., 28 Adelaide Street W., Toronto.

A NEW VISE

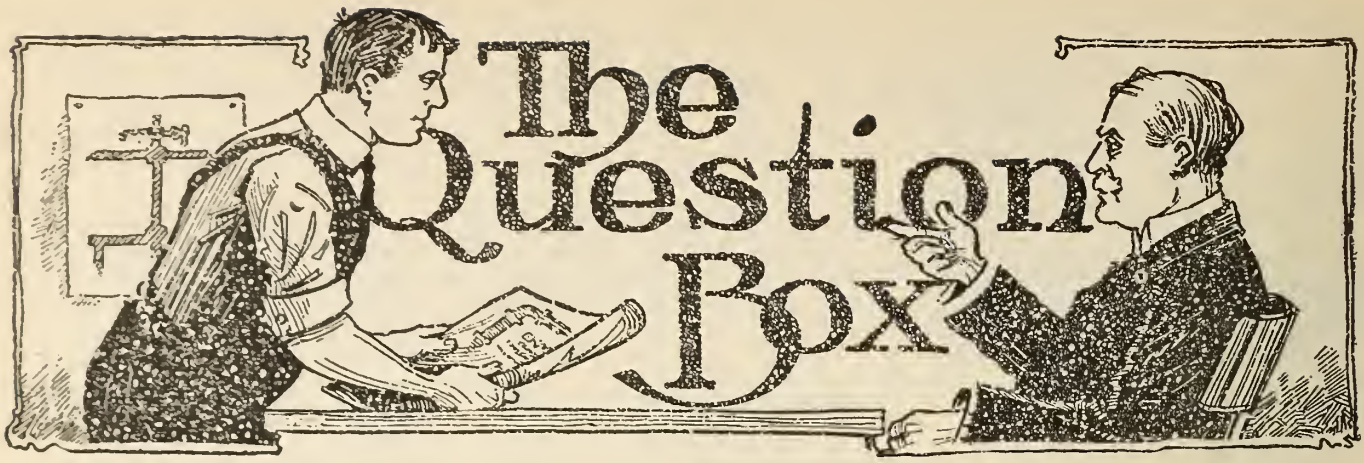
Of all tools which need to be handy, compact, and of such design as not to militate against their usefulness, the pipe vise is perhaps the chief.

The first thing to consider when choosing such a tool is, "Will it hold a pipe without crushing it?" The next is, are the parts, such as jaws, screws, guides, etc., interchangeable? and, lastly, its weight. The Marx Whittington No. 1 vise is said to have all these qualifications and more. The No. 1 vise will grip (not crush) any pipe from ¼ in to 1½ in., and only weighs 4 lbs. A cut of this vise appears on this page.



Marx-Whittington No. 1 Vise

Those wishing to secure further particulars may do so by writing to The Marx-Whittington Company, Easton, Pa., U.S.A.



Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WHO MAKES OIL BURNERS FOR HEATING FURNACES?

Editor The Sanitary Engineer.

Please furnish me with the name and address of any manufacturer of oil burners suitable for heating furnaces.

E. CARDWELL, Welland.

The Three O System Co., 353 Yonge Street, Toronto.—Editor.

A CONNECTION WHICH WILL NOT WORK—WHY?

Editor The Sanitary Engineer.

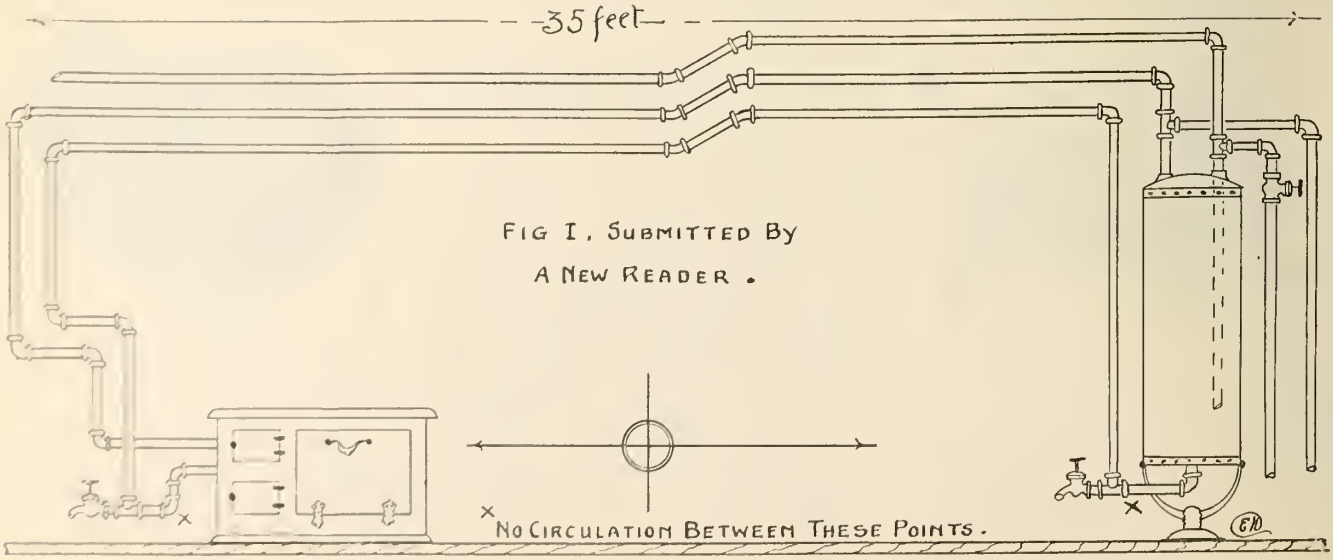
The attached is a sketch of a range connection which will not work. The pipes are run from the range in the kitchen to the boiler in the bathroom. No hot water can be got; in fact, the boiler does not heat at all. The reason the pipes are all run up overhead is because of there being a door in the way and the windows are too low to allow of the piping being run below them. I should be greatly obliged if you would kindly explain the failure of the boiler to heat. A NEW READER.

Fig. 1 is a reproduction of the sketch sent in by "New Reader," and in Fig. 2 is shown how the trouble can be overcome. Fig. 3 also shows what is necessary in all such connections.

There is a principle involved in all piping plans which are installed to convey heat from one source to another, such as heating water in a range boiler or any other hot water heating system. And that is, that circulation must be established. The next point is, that there should be as little friction as possible, which is caused by too many fittings being used. Too many fittings and unnecessarily sharp bends, as well as cutting the pipe with cutters that make heavy burrs, are all accountable for 90 per cent. of friction, which decreases the heating capacity of the installation. Now, Fig. 3 shows a number of circles, with various lines enclosed. These lines really describe what would be termed as lines of circulation. They are, to use a paradoxical expression, irregular circles, which run in such a way as to be partially in circuit and appear in every equal division of a true circle. To illustrate our point, see Fig. 3, A B C D and E.

The first section A illustrates what has been done by the person who installed the system, shown in Fig. I, submitted by our correspondent. It will be seen that there is no possible way of establishing a circulation, because the upper and lower pipes at the range are not in circuit with each other. The moment heat is applied in the range expansion takes place in both pipes at once, and they are both as it were pushing or expanding against the water in the range boiler, thus making it impossible to establish circulation.

By turning to Fig. 3 and examining B, it will be seen that a complete circuit is made, that there are pipes in each quarter of the circle. A further glance at B will also explain Fig. 2 installation, which will solve the problem under discussion. C shows a simple range connection. D describes how a range may be connected to a boiler on a lower floor than the range. E shows how a range boiler should be connected when hanging on the ceiling of a room



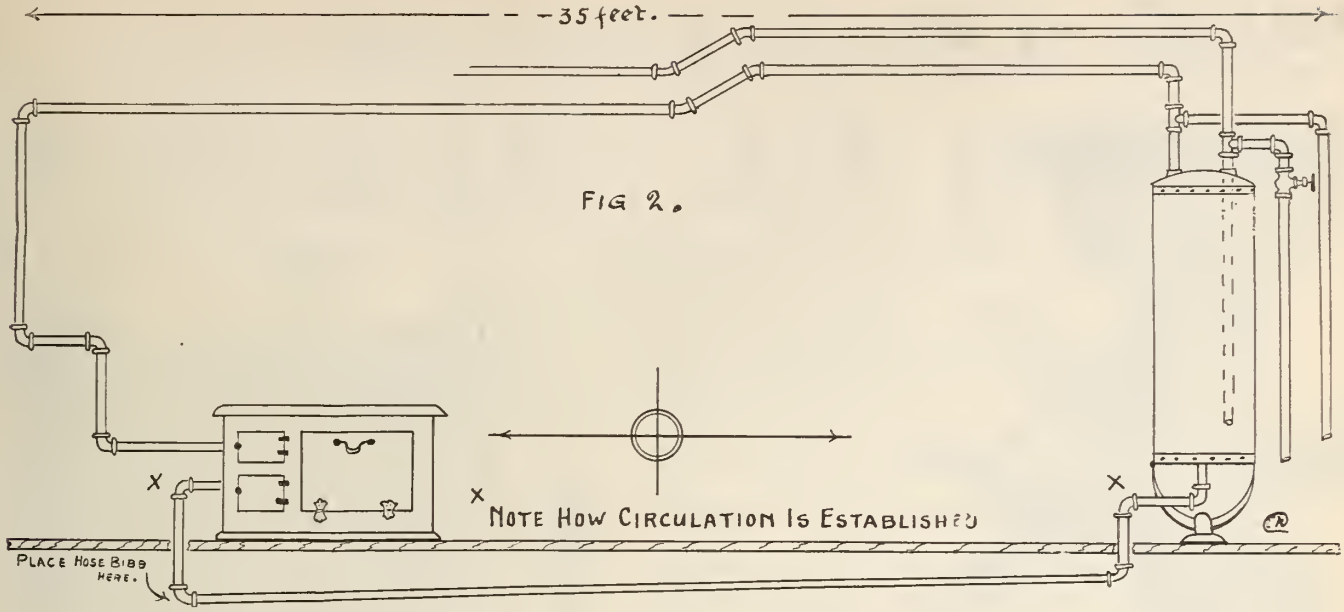


Fig. 3

lower than the room in which the range is situated. The main point to observe in Fig. 3 is that B C D and E all form irregular circular pipe lines.—Editor.

HOW TO CONNECT WATER BACK AND GAS WATER HEATER TO RANGE BOILER

Editor The Sanitary Engineer:

I find The Sanitary Engineer very useful to me in many ways and would like you in your next issue to show how a water back and gas water heater should be connected to a range boiler.

N. R. W., W. Ontario.

There is no subject under the sun as interesting to the sanitary engineer as the connecting of range boilers to various kinds of heaters. and water backs. Fig. 1 shows how such an installation should be made. The chief point is to eliminate friction as much as possible; do not try and "make" the pipes come together, as this creates strain on some point or other. Only just recently a range boiler was found to be leaking at the side connection and after careful examination, it proved that a great strain had been placed right on the side connection by the fact that the boiler was jammed against the wall and the pipe had been sprung into place, then when

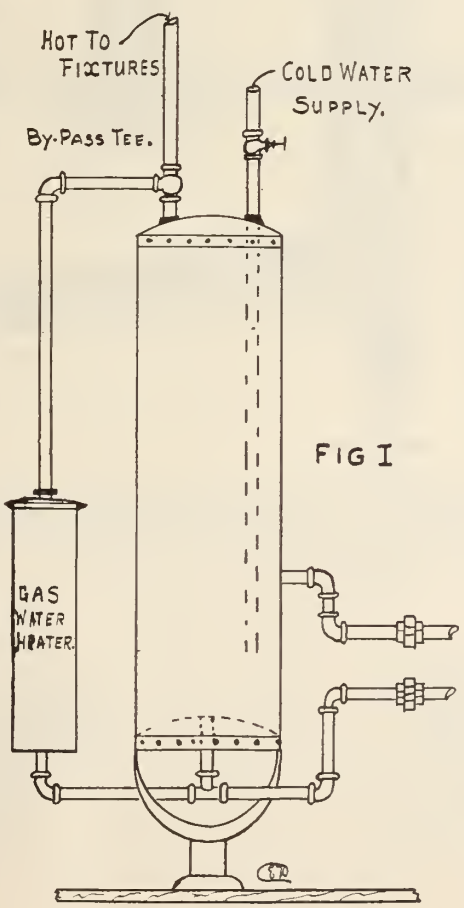


FIG I

the connection got heated the expansion caused it to leak.

The next point is never use any other than metal to metal unions, rubber washers vulcanized and almost any ordinary gasket soon deteriorates, because of the intense heat, and the frequent expansion and contraction which takes places. Last, but not least, to be remembered is the need for some type of bypass tee. Very little importance has been given to the need of this kind of fitting but when once a person has used them and has proved their efficiency it is seldom if ever the bypass tee is left out when connecting gas water heater and ranger water back to a range boiler.—Editor.

New Types of Air Moistener

The rapid growth of humidification by the use of steam, and the increasing demand for such appliances, has resulted in the development of new types of the device as shown by the accompanying views.

Fig. 1 is an exterior view of the single pipe type; it is made in three sizes—Nos. 3, 4 and 5, with ¾-in., 1-in. and 1¼-in. pipe threading. Connections of such size are essential to insure a sufficiently low velocity in the flow of steam so as to allow the condensation to flow back against the current. While with

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the smaller and medium sizes the one-pipe type is economical to install, it becomes impractical in the larger ones on account of the size of the pipe that would be required. The larger sizes are, therefore, of a two-pipe design, as shown by Fig. 2, which allows of the use of quarter and three-eighths inch piping, one a supply, the other a return. The slight condensation may be handled by connecting with a trap, which discharges at a lower pressure than that of the supply, or if desirable to return the condensation into the same pressure as the supply, the return pipe may be so designed as to afford a sufficient water seal to prevent reverse flow in the return pipe; in which case, of course, the point of return must be lower than that of supply.

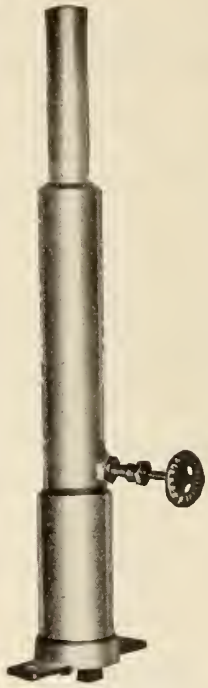

Fig. 1. Single Pipe Type

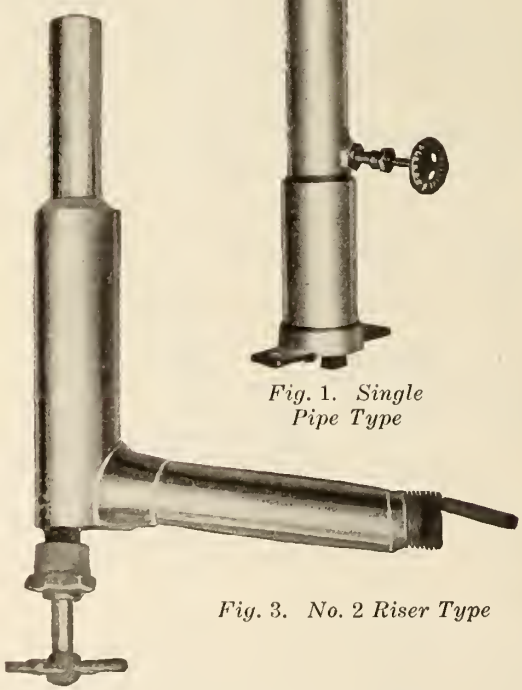

Fig. 3. No. 2 Riser Type

The No. 2 size has proven to be of about the capacity required to humidify the space which is heated by an average-sized radiator. This, however, is designed for attachment to radiators. But as it is desirable to have the means of heating and humidifying separate, this desirable combination is had in those cases where vertical steam risers are employed, by attachment of an equivalent size to the riser, for which purpose the No 2 riser type, shown by Fig. 3, has been devised. This has a long stem carrying it a proper distance from the riser, into which it screws by a ⅜ in. pipe thread, the slope of the connections giving ample drainage, as they screw directly into the riser or radiator without the intervention of any piping at all.

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Fig. 2. Double Pipe Type

Unnecessary mention of higher formations, such as brigades, divisions, is strictly forbidden, and causes delay.

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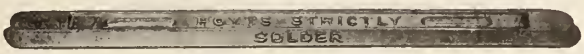

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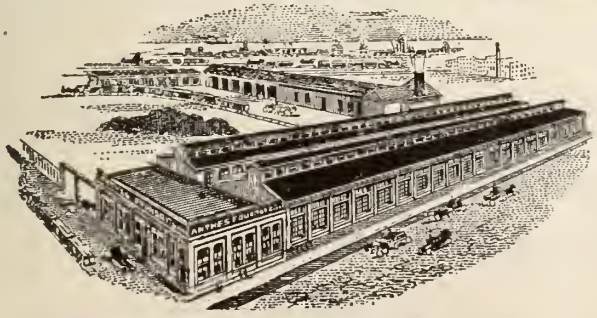

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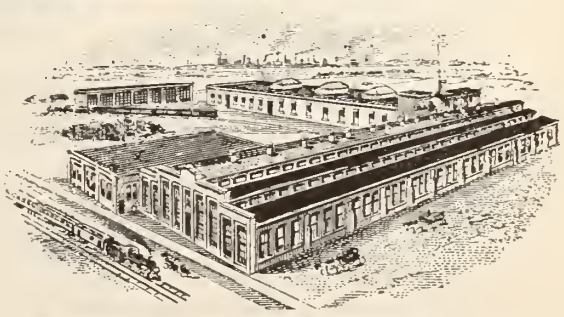

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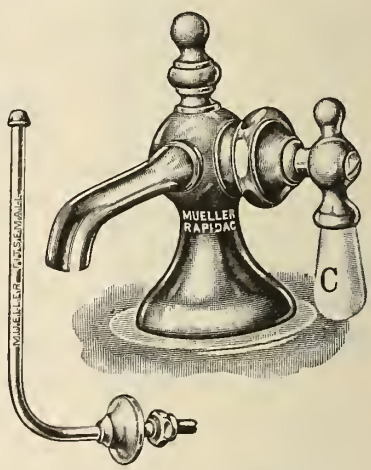

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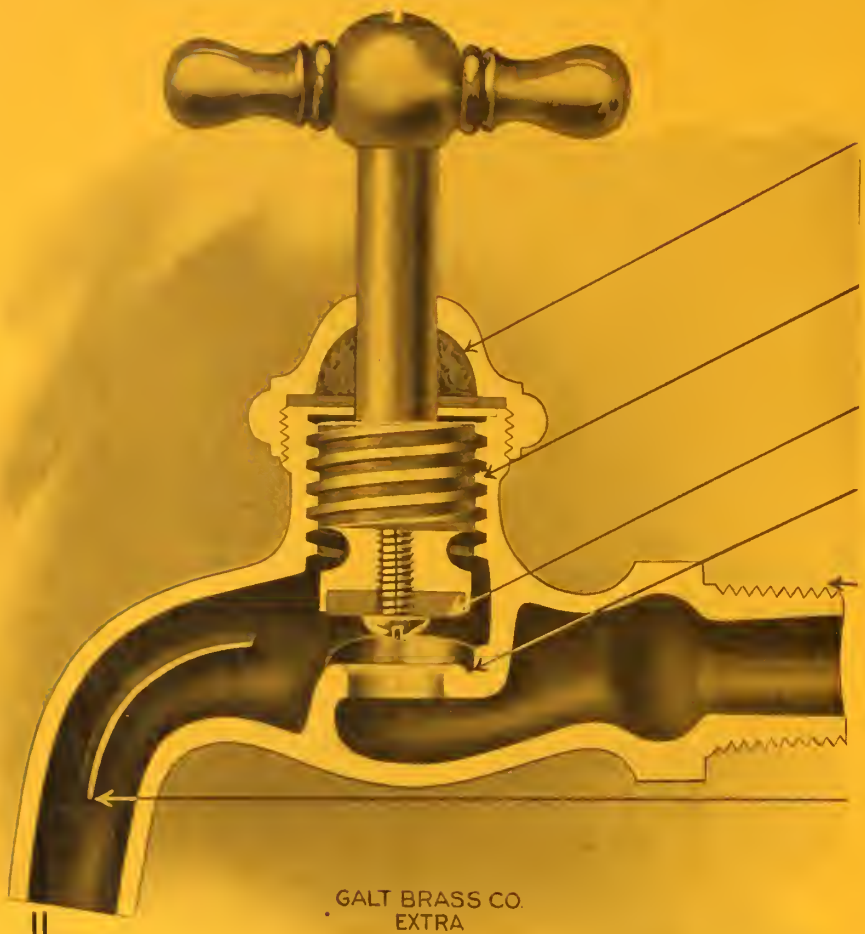

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PLUMBER & STEAM FITTER of CANADA

THE MACLEAN PUBLISHING COMPANY, LIMITED, PUBLISHERS

Vol IX. Publication Office: TORONTO, DECEMBER 1, 1915 No. 23

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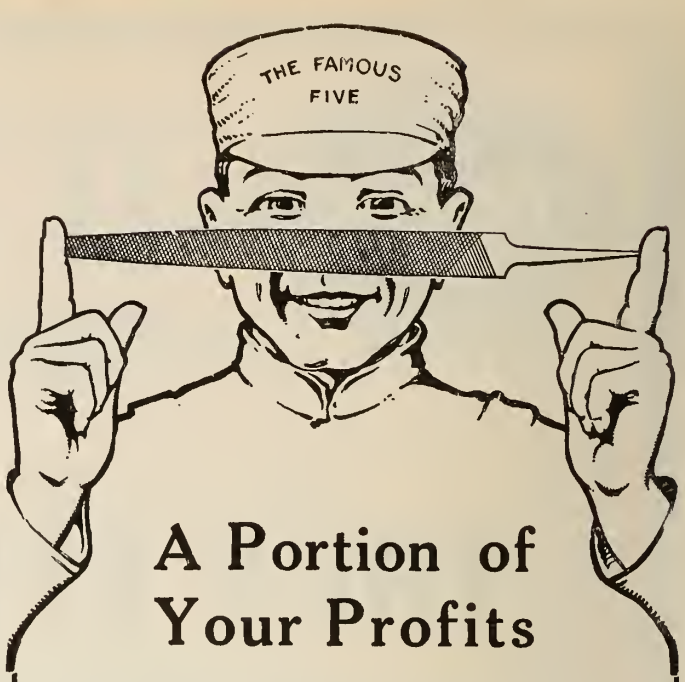

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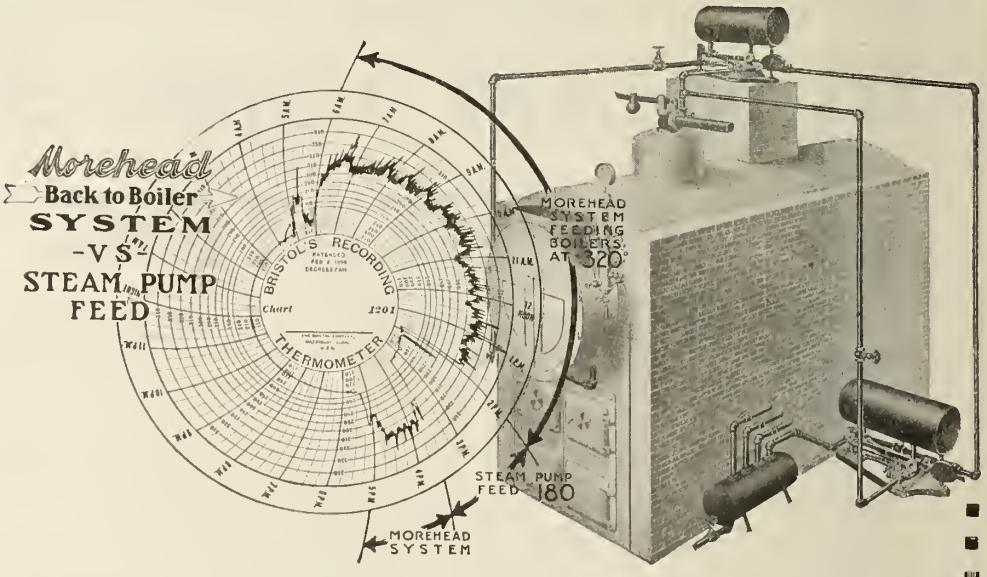

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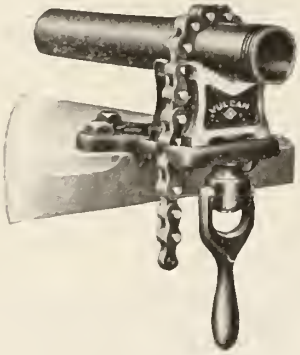

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We recently announced that a test was being made between the Presto Heater and a heater of another make—

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Drop us a line to-day—you will not be obligated in any way—in fact we will consider it a favor if you will write.

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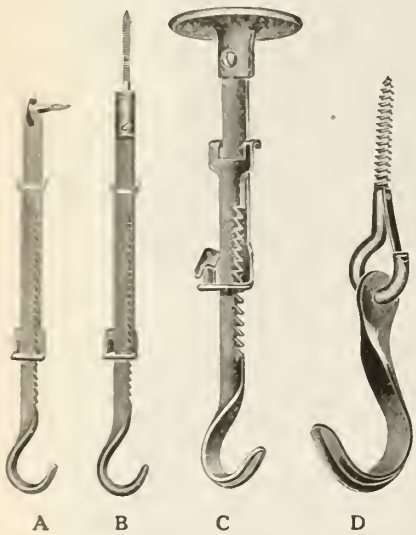

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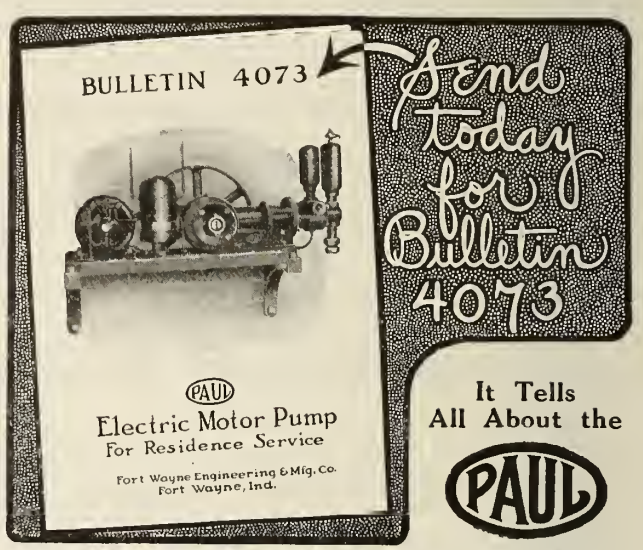

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The ball with the reinforced top which makes elongation impossible.

Made of the finest rubber and will outwear three ordinary tank balls.

Our full line of Quality Rubber Goods are at your command, and if you want to give satisfaction all the time, use only Wolverine goods.

Canadian Wolverine Company
Limited
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What's the Matter With This Job?

Did you read an article under the above head on page 34 in the November 1st issue of the Sanitary Engineer? Get the issue referred to and read this article before going further—you will be interested and instructed.

The gentleman who wrote this article in the Nov. 1st issue of this paper signed his name "PUZZLED." The subject he took up has puzzled thousands of fitters the world over, but we believe Sanitary Engineer has answered him in a very practical manner—circulation, brother, circulation.

Assuming that the small pipe system has been used, with pipes properly proportioned and reductions made at the right places, resulting in a well-balanced job, the next thing to be considered would be pressure.

HONEYWELL
Heat Generator

In the article mentioned, the Editor of Sanitary Engineer concludes by saying "A good heat generator would increase the efficiency of this system without doubt."

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SANITARY ENGINEER
PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, DECEMBER 1, 1915 No. 23

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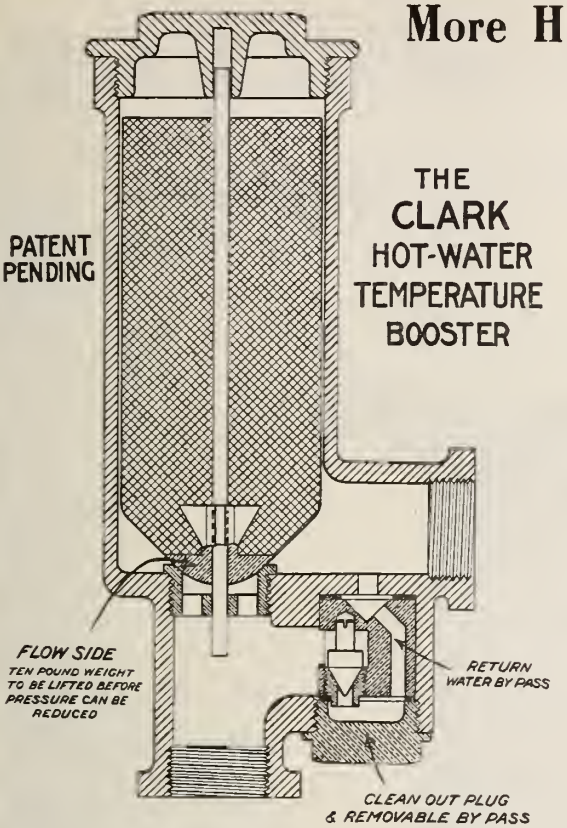
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THE SANITARY ENGINEER

VOL. IX. DECEMBER 1, 1915 No. 23

What Is True Efficiency?

The Term Efficiency is Often Misapplied. Saving What Should Never be Lost is Not Efficiency. Trying to Get More Than One Pays For is Not Efficiency. Buying at 90 Days, Carrying Big Stocks and Having Cash in the Bank at 3 Per Cent. is Not Good Buying. Efficiency Can Only be Arrived at Where True Co-operation is the Rule

IN almost every line of industry at the present day the demand is rampant for greater efficiency. Various definitions of the word have been given at different times, but there are a certain class of its disciples who are apt to discredit the term by attaching to it a meaning far removed from the real signification of the word. We refer to those who consider that efficiency consists simply in getting through more work in a day than at any previous time, in using less raw material to manufacture any particular kind of goods, in using up old tools which make a thread "just as good" as they ever did, and in a variety of ways managing to make one's employees work as if they were mules rather than human beings.

We have efficiency men and efficiency men. The one a class of men well worthy of the name; the others, a by no means inconsiderable proportion, appear to have acquired the name on the "lucus a non lucendo" principle; that is to say, they are so called from the fact that they have no spark of efficiency in them.

In a recent issue of the Saturday Evening Post there appeared an article entitled "Scrap," which gave some idea of the immense amount of valuable material which was reclaimed from the scrap heaps of the various railway companies, and the reclamation of this material was looked upon as a striking instance of efficiency on the part of the railway management.

This point of view is all very well in its way, but to any real seeker after efficiency, it must have appeared as a most glaring example of inefficiency and incompetence on the part of those responsible for the unnecessary purchase of so much material that was not required. In what light does it show the purchasing agents of the railways in question? Where does the efficiency come in, in engaging one set of men to make holes in a vessel and at the same time to keep another set of men busy plugging up the holes the others are making? Looked at in this light the article was a huge joke. Why were the holes allowed to be made in the first instance?

There is a class of employer by no means rare at the present time who, if he can manage to cut down salaries, lengthen the hours of work by an hour or so a day, and buy goods at 90 days, prides himself upon the fact that he is putting efficiency methods into practice; but is he?

A case in point came to the writer's notice quite recently. It was that of a sanitary engineer who carried a large stock of goods, whose credit was good, who bought at 90 days, and who to all outward appearance kept a thorough up-to-date establishment, and no doubt prided himself on the efficient manner in which he was running his business. Yet with money in the bank he was paying a high rate of interest on his purchases of goods, purchases, too, which were in all probability far beyond his requirements. In spite of the big stock he carried, owing to his lack of system in keeping tab of it, it would be quite as likely as not to happen that if anyone called for, say, half a dozen one and a quarter inch elbows, he would be out of that particular size. Where was the efficiency in all this? Efficiency in buying! Efficiency in financial economy! Efficiency in stockkeeping! It was conspicuous by its non-existence.

Further, this same concern called all their men together and told them that on account of the war they would have to ask them to work 10 hours a day instead of the usual 9 hours. The men perforce accepted, but with what heart? Was it efficiency to squeeze out this extra hour from the unwilling workers? Did the firm really benefit by it?

Another case in the same category came to our notice some time ago where a certain employer found it necessary to lay off a number of his men, one of whom had been in his employ for four years or more. This man suggested that he should make a special effort in canvassing and try to dig up a few jobs, and asked whether in this case any commission would be allowed him. The employer replied that if the man was not sufficiently loyal to do all he could in the way of getting jobs without receiving commission he could leave it alone, and he refused to entertain the idea of a commission.

To-day that employee is working for himself and making a fair profit; buying in small quantities for cash and requiring cash in payment for all he does, and he is steadily building up a reputation as a reliable and conscientious tradesman.

Here we have an example of inefficiency on the part of the employer, with unappreciated efficiency on the part of the employee. It is no good attempting to disguise the fact that nine out of ten employers in our line are not as efficient salesmen as the journeymen they employ. It is a well-recognized fact that when wages and salaries are all paid the boss, as a rule, gets the thin end. Why? Simply on account of his lack of knowledge of the science of salesmanship.

Now, where is the remedy to be found? Undoubtedly in closer co-operation between employer and men. Take your workmen into your confidence; make them your partners, not only at the salary end but also at the construction end. When you undertake a job, discuss that job with the man you intend putting on it, let him feel that it is as much his job as yours. Ask his opinion as to the time it will take, the materials necessary, etc., and without doubt he will do all in his power to make the job a profitable one.

Some may argue that in this way the man would very soon be in business for himself. What if he is? Do you think you are going to prevent him going into

(Continued on page 15.)

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

Article 17

As a matter of interest the sanitary engineer naturally wants to know something of how the important bacterial diseases can be communicated. Such knowledge is, too, important in that it places the engineer in a position to know exactly what he is fighting against. We often hear the expressions disease and filth used in a general way but more particular knowledge on the subject would lead to the right sanitary precautions being taken in each particular case against disease or filth. Some diseases are contagious and contact with the individual suffering from the disease is to be avoided while on the other hand there are diseases in which there is no particular danger in touching the patient and infection from such diseases is accomplished in some other way.

The medical man is needed to combat disease when the patient has contracted it. The duty of the sanitarian and sanitary engineer is to make the medical man lose as many "jobs" as possible — by preventing the spread of communicable diseases. This article will be devoted to a short discussion of the bacteriology of different diseases which are of direct or indirect interest to the sanitary engineer.

Most important of the diseases with which the sanitary engineer has to deal is typhoid fever, already described. This is on account of the fact that this dangerous infection with its high death rate is generally caused by or associated with polluted water supplies. The sanitary disposal of sewage, and the purification of water supplies are both essential functions of the sanitary engineer. Other bacterial intestinal diseases and for that reason water borne diseases are cholera and dysentry. As already pointed out cholera is an Oriental disease and with the methods used in preventing the spread of disease by immigrants it is unlikely that cholera can gain a foothold in North America. The same precautions can be taken against dysentry or any water borne disease as were mentioned in the case of typhoid.

Tuberculosis

Tuberculosis, especially of the lungs, though not so important from the standpoint of the sanitary engineer, is, like typhoid fever, as dangerous, but also like typhoid, an entirely preventable disease. The influences at work in the case of typhoid are largely under the control of the community which can take the necessary steps to prevent pollution of, or provide, pure water supplies. Tuberculosis, on the other hand, reflects in a greater degree the life of the individual. It is a disease of house life and the pest of the overcrowded portions and slums of our cities. The delicate child, born of ignorant, dissipated or disease-weakened parents does not generally receive proper care. Living under unfavorable conditions and further weakened by an attack of measles as a child or from typhoid in later life, he becomes a prey to tuberculosis generally of the lungs. The struggle may last for years, but it is a losing game, his ability to labor becoming less as, especially if he marries, the demands on him become greater.

Fig. 41.—*How pneumococci look under the microscope when magnified* 1,000 *diameters.*

A remarkable fact to learn is that it is estimated that over 60 per cent. of our population have or have had tuberculosis somewhere in the body. The infective agent is the tubercle bacillus. In trying to throw off these bacilli the tissues of the cells of the body form nodules or tubercles (hence the name) which at first are only pin head in size. In the majority of cases they cut off the bacteria from the rest of the body. It is estimated that 90 per cent. of all tubercular cases get well and never know they have the disease.

If the attempt of nature to localize the bacteria is unsuccessful, as is generally the case with people weakened by various diseases or naturally weak, cavities are formed (most frequently in the lungs) by the breaking down of the nodules and may destroy arteries or veins and cause hemorrhages. Tuberculosis of the lungs is termed consumption.

Tubercule bacilli are contained in the various discharges of the patient but especially of the sputum, the matter coughed or spit up by a consumptive. This sputum when spit upon the floor, wall, street or elsewhere gets on boots and clothes and then on the hands and eventually to the mouth. If the sputum dries it floats in the air and the dust particles may contain thousands of bacteria which find entrance to the lungs with the air breathed. Dust in a room or covered conveyance is more dangerous than dust out of doors, where many of the bacteria are soon killed by strong sunlight, heat and rain. Infection may occur by swallowing food on which dust containing tubercle bacilli have settled; or the food may be infected from cups and spoons used by a consumptive.

From 10 per cent. to 40 per cent. of cattle have tuberculosis and the bovine tubercle bacilli readily infect children and to a less extent adults. It is estimated that at least 10 per cent. of the milk supplied to large cities contains tubercle bacilli derived from infected cows. The importance of having the regulations made by the Department of Agriculture carried into effect cannot be too strongly advocated. By such regulations municipalities of five thousand or over may have the aid of the department in controlling bovine tuberculosis; suspected milk supplies may be pasteurized and tubercular cattle slaughtered. Besides the germs of tuberculosis there may be carried in milk the bacteria or organisms that cause typhoid, scarlet fever, diphtheria and measles.

There is nothing to show that the breath of a consumptive is dangerous; the danger lies in the sputum or discharges containing the bacteria.

The sanitary engineer may note that the spread of tuberculosis is favored by uncleanliness, overcrowding and imperfect ventilation. Of particular interest to him is the latter condition as it is his duty and privelege, when the opportunity affords, to provide free ventilation for fresh air.

Pneumonia

The bacterium that causes pneumonia is the penumococcus. Pneumococci (see Fig. 41) are present in nearly every nor-

mal individual, being found in the mouth and nasal cavities. It has been mentioned that staphylococci and streptococci (see Fig. 3, article 2, April 15th) are always present on our skins, but do us no harm (see article 5, June 1st) unless there is a cut or an abrasion of some sort, when the first may cause carbuncles and boils and the latter spreading inflammations and erysipelatous conditions. In the same way when the body is weakened by such diseases as typhoid or diphtheria, the lung is attacked and unable to resist the pneumococci which are present but ordinarily do no harm. Cold, alcoholic excesses and bronchitis may all weaken the resistance of the lungs to fight off pneumonia.

Anything that irritates the lungs like dust or dirt inhaled makes pneumonia more probable. While in the last few decades some diseases have been successfully understood and fought, pneumonia is one disease that is on the increase due to the irritation of the lungs caused by the smoke nuisance, one of the attendant evils of our civilization. This point is well illustrated in an editorial article appearing in The Sanitary Engineer of September 15th.

Pneumonia is a bacterial disease, but it can hardly be classed as a communicable disease for the bacteria that cause it are nearly always present in the individual awaiting their opportunity when the lungs are weakened in any way. It has been discussed here because of the fact that the smoke nuisance is such an important though indirect cause of pneumonia. Sanitary engineers are of course interested in the abatement of this smoke nuisance for this as well as other reasons.

Diphtheria

Diphtheria is a disease generally of the throat though sometimes of the nose, eyes or any part of the body. The diphtheria bacilli (see Fig. 42) gather in the mouth where they cause false membrane and ulcers to form.

Diphtheria is both infectious and contagious and is chiefly caused by direct contact with the person harboring diphtheria bacilli. Children are more susceptible than adults to the poison produced by the diphtheria bacilli. After a person has recovered from the disease he may carry the bacteria in his throat for as long as six months and during such time is a menace to those about him.

Outside the body under certain conditions diphtheria bacilli may live for some time but exposure to air and sunlight tends to kill them rapidly. Proper ventilation will, therefore, aid in the fight against this infection.

Smallpox

Smallpox is a disease to which a great deal of interest attaches. It formerly wrought havoc among the nations of Europe, and has for many years been closely studied. As far as the writer knows what the particular bacterium or organism is that causes the disease has never been definitely determined. About the year 1800 it was discovered when a person was inoculated with vaccine prepared from a cow suffering from cowpox that a very mild form of small pox resulted and the person was afterwards immune from smallpox. It was at first thought that this immunity would last for life, but it has been found that revaccination is necessary. The term vaccination refers particularly to smallpox, but it is now used in a general way with respect to other diseases where patients

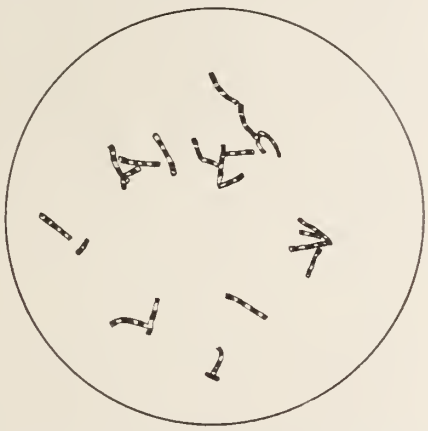

Fig. 42.—How stained diphtheria bacilli look under the microscope when magnified 1,000 *diameters.*

are inoculated with a mild form of disease, as in the case of typhoid, with the hope that the subject will be immune against the real disease.

Smallpox is contracted by direct contact or by exposure to emanations from the body of a person sick with the disease. It is most contagious when the eruptions are in active progress.

The vitality of the smallpox bacteria or organisms are very great. Infected articles if kept from the air may spread the disease a long time after the original outbreak.

Other Diseases

Scarlet fever and measles are other communicable diseases of which the bacteria or agents causing the disease have yet remained undiscovered. The writer was recently informed by a practising bacteriologist that he was of the opinion that scarlet fever was probably caused by a variety of streptococci.

Both diseases result in rashes. Contact is dangerous and the mouth secretions are infectious.

Measles is a very serious disease when it is considered that more children under two years of age die from measles than from any other contagious disease. Exposure to all infectious and contagious diseases should be avoided. A few years ago parents often exposed their children to such diseases as measles and mumps, believing that they would ever after be immune to such diseases, which seemed to be more serious in the case of adults. This is a terrible mistake, as the child may die if so exposed. On the other hand, with proper sanitary precautions and cleanly habits the risk of infection of such diseases is very small.

In the case of anyone being infected with measles sanitary precautions consist in burning or disinfecting articles receiving the discharges from the nose and throat of the patient and burning all fragments of skin cast off by the patient. The patient's room and its contents should be thoroughly disinfected, while the attendant should take every precaution in sterilizing or disinfecting utensils and his clothes and hands.

The bacteriology of many other diseases present points of interest, but is not within the scope of this article. Enough diseases have been discussed to show that if the plumbing of a house is so arranged that it allows for the collecting of dust and dirt in corners hard to get at, bacteria may lodge and add to the difficulties of disinfection. In a dark corner many bacteria thrive that in the fresh air and sunlight would be quickly destroyed. Living in a house heated only with a dry heat, with no provision for sufficient moisture, has a detrimental effect on the skin, mucous membrane and lungs, making them more readily susceptible to certain bacterial attacks. The importance of ventilation has been fully touched on. In many ways, then, can the sanitary engineer be a factor in preventing the spread of communicable diseases other than the, to him, most important of all—typhoid fever.

(Continued in next issue.)

WHAT IS TRUE EFFICIENCY?

(Continued from page 13.)

business for himself, if he is so minded, by holding yourself aloof from him as if his interests and your own were antagonistic? Is not he far more likely to feel a desire to work for himself in the latter case, than he would be if you treat him as a colleague. Experience, moreover, proves that a large proportion of men prefer a good salary to running a shop for themselves. There are hundreds of men to-day in the business who were better off on a salary than they are at present.

Let unselfishness and progressiveness permeate the whole of your business life. Aim at real co-operation with your workmen: get their confidence: make them see that your interests and theirs are identical: prove to them that you are interested in their welfare and they will respond by doing all they can for your mutual benefit. This way lies the road to true efficiency.

Analysis of Canadian Plumbing Bylaws

Proposed New Plumbing By-law for Montreal—Many Clauses Not Only Ridiculous, But Impracticable, Proving That Sanitary Engineers Should be Consulted in Such Matters—The Sanitary Engineer Takes Full Responsibility for the Criticism Published in This Series of Articles.

ARTICLE 7.

IN this issue will be found several very important sections commented upon, some of which appear to contradict themselves.

Sleeves Prohibited

Section 660.—It is forbidden to use either brass or iron sleeves for connecting any water closet with a soil pipe.

Closets, Materials of

Section 661.—When water-closets are so constructed that the trap is part of the closet, then they shall be of all glazed earthenware or enamelled iron, or a combination of these materials.

Closets, Porous Prohibited

Section 662.—All water-closet receivers shall be either of porcelain or of enamelled iron; no stone, cement, brick, wooden or other porous substance shall be permitted.

It might not be out of place to remark here, in regard to sections 656 to 660, inclusive, that a set of drawings would have better described these sections. We strongly recommend drawings in cases of this kind. This is the day of illustrations and almost every ordinarily educated person can understand a picture, therefore descriptive illustrations in all plumbing by-laws would fill a long-felt want which no doubt the trade as a whole would appreciate.

Urinals, Material and Supply

Section 633.—Urinals shall be either of enamelled iron or porcelain, and, excepting flushometer urinals, shall be supplied from a tank or tanks or water connection which shall be used for no other purpose.

Urinals, Group

Section 664.—A group of urinals may be supplied from one tank, the capacity of which is to be proportionate to the number of urinals supplied but in no case shall the capacity be less than one gallon for each urinal served. The flush pipes shall be at least one inch (1 in.) in diameter to each urinal.

With Section 663 we find no fault. But with Section 664 there is ample scope for criticism. For instance, this section would allow almost any number of urinals in a group, providing there be a large enough tank. No mention is made as to the location of tank, or size of main flush pipe which would furnish water to the vertical line of flush pipe. Under this section, anyone could install a tank with a capacity of 6 gallons and fit six urinals up with one-inch flush pipes. Any practical man should know, that even though the tank in such case was fitted in the centre, the first urinal would be apt to get the best service; the second would be about 3 feet away and the third 6 feet away.

With a battery of 6 urinals, the ones furthest away from flushing tank would get very poor flushing. Another thing: the horizontal pipe from tank should never be less than 1½ inches with not less than one-inch vertical pipes, and we would not advise more than 3 urinals to constitute a group, if tank is to be situated at one end, and four to constitute a group when tank is fitted up in the centre of group.

Urinal, Group Defined

Section 665.—More than two urinals placed near one another shall be considered as being a group of urinals and the flush pipe or pipes thereto shall be so arranged as to provide an equalized pressure and volume of water to each and every urinal in the group.

Urinal Supply Floor

Section 666.—Excepting flushometer urinals, urinals situated on different storeys shall be supplied by tanks, located on the same storey as the urinals.

Hoppers, Etc.

Section 667.—Slop hoppers and scullery sinks shall be connected to the waste pipe with lead pipe wiped into a brass ferrule caulked to the waste pipe with molten lead; or they may be connected with an iron or brass connection.

Draining Into Hoppers, Sinks, Etc., Forbidden

Section 668.—It is forbidden to discharge the waste from any down pipe or plumbing fixture into any intercepting hopper or slop or scullery sink except as herein provided for.

It will be seen that Section 665 demands that two urinals shall constitute a group, but it does not say what limit there is in number for a group.

Neither is there any mention as to size of piping required for such a group of unlimited number.

In all, there is, in our opinion, not sufficient importance given to the urinal question.

In Section 666 the question of flushometers is mentioned, but no mention is made as to the amount of water these flushometers shall be required to discharge. Neither for urinals or water closets is the question of quantity of water mentioned where flushometers are used.

Hopper, Etc., Trap

Section 669.—All slop hoppers and slop sinks shall be provided with suitable traps of not less than two inches (2 in.) internal diameter.

Hopper Stack

Section 670.—Wherever it is required that the size of the waste be increased as, for instance, in the maximum number of hoppers and of slop sinks, then the increased size shall be run up with undiminished bore to above the roof line.

Section 669 is not what would be defined as sufficiently adequate to fill the purpose. It simply says "all" slop hoppers and slop sinks shall be provided with suitable traps of not less than 2 inches internal diameter. But does not state how many shall be connected into one two-inch pipe.

Then Section 670 makes some attempts to fill the bill, but does not, though it would appear that some mention had been made of the size required for more than one such fixture. Neither is there any mention made that we can see in any other portion of this by-law which makes any reference to the number of such fixtures which will or will not be allowed on any given size of waste pipe.

Without doubt, some size should be

mentioned. Another matter would not be out of place when discussing the waste pipes of such fixtures, and that is the length of horizontal waste pipe which may be installed without a clean-out.

In our opinion, there should be a clean-out placed on every run of more than 5 feet up to 10 feet. The clean-out should be the same size as the pipe, viz., 2 in. diameter.

Dentists' Cuspidors

Section 671. — Dentists' cuspidors shall waste through a one and a one-half inch (1½-in.) trap, and the trap shall have a one and a one-half inch (1½-in.) vent pipe. The trap shall be within two feet (2 ft.) of the waste pipe. Two or more cuspidors shall be wasted and vented by not less than a two-inch (2-in.) main waste pipe and vent. On the inlet side of the trap an extension of one inch (1 in.) waste pipe may be run to a length not exceeding six feet (6 ft.) reckoning from the seal of the trap.

Beer Pumps

Section 672.—Beer pumps, the wastage of which discharges into the plumbing system, shall be connected to it through either a regular and properly connected branch fitting or through a properly drilled and trapped orifice cut into the wastage pipe to which the connection shall be made by a heavy brass male-and-female-threaded nosing spud, the male thread of which shall be made sufficiently tapering to insure a tight and perfect joint.

Section 671 is somewhat strange in a way, particularly that portion which says: "On the inlet side of the trap an extension of one inch (1 in.) waste pipe may be run to a length not exceeding six feet (6 ft.) reckoning from the seal of the trap." We cannot see why in the first place a one-inch waste pipe is allowed under any circumstances, and why should there be such an extension allowed, unless it be for an additional fixture, in which case the provisions provided in Section 676 are cancelled.

Section 672 is altogether unfair to the sanitary engineer. It allows certain methods of making branches into the sewer side of traps, which are not in accordance with good sanitary construction; all that is needed to make Section 672 effective and practical would be to have it end with the words "properly connected branch fitting."

Wooden Fixtures, Restrictions

Section 673.—It is forbidden to install a wooden sink or waste tray.

Baths—Wood Prohibited

Section 674.—It is forbidden to install a bathtub having a wooden frame lined with sheet metal.

Fixtures to Permit Free Air Circulation

Section 675.—All fixtures shall be open to the free circulation of air.

Traps, General Provisions

Section 676.—All fixtures shall be effectively trapped and vented and the traps and vents shall be placed as near as practicable to the outlet of the fixtures served.

Sections 673 and 674 could very easily have been embodied in one section, which could and should be made even more drastic.

There are hundreds of old wood baths, sheet metal lined, in Montreal which are in an abominable state. They leak and are repaired time and time again; they are even removed and relined and put back again.

This should not be allowed, and any self-respecting plumber should refuse to try and repair such a fixture, because of the fact of its being so insanitary. The filth which lurks hidden under floors, etc., of those sheet metal lined fixtures is beyond the imagination of anyone except, of course, those who have removed them from time to time. We would strongly recommend that when the fixture under discussion is found to be in such a poor state of repair that it needs removing to effectively make the repair it should not be allowed to be replaced.

Section 675 is of no value at all, is quite meaningless, and should therefore be looked upon as simply so much misapplied printers' ink and waste of space.

Section 676 is to the point; it means all its says, and should be carried out to the letter, with the exception of such cases as, say, a group of wash basins when installed in the toilet rooms of a station, hotel or public building where there is plenty of light and openings to the outside air.

Traps, Separate

Section 677.—Every fixture shall have a separate trap. In the case of groups of closets, groups of urinals, and groups of basins, this provision will be met by each group having a separate trap.

The above section begins by practically repeating the first few words of Section 676. But, it goes on further and makes certain very drastic as well as impractical exceptions. It practically defines a group of closets, urinals or basins as one fixture, which should not be. Without doubt a group of closets should not be defined as one closet, else under this section hopper closets may be installed simply because of the fact that the construction of all modern w.c. bowls are traps in themselves, and, in spite of their being grouped, would each be separately trapped.

Trap Restrictions

Section 678.—Excepting as specified in these rules, in no case shall the trap of one fixture connect with the trap of another fixture.

Traps, Relative to Vent

Section 679.—Excepting as provided for in these rules, in no case shall the trap serving a fixture be placed at a distance greater than one foot (1 ft.) from the outlet of the fixture it serves, no shall the vent pipe serving a trap be placed at a greater distance than two feet (2 ft.) from the trap it serves.

Referring to Section 678, we might say that no practically compiled by-law should ever infer that anyone might try to connect one trap to waste into another, because of such a course being altogether out of reason.

In the case of Section 679, much may be said. For instance, no one would ever dream of placing a trap more than a foot away from the fixture it serves, and as regards the vent being allowed up to 2 feet away from the trap, such is out of the question. A vent should be no less than 3 inches from the top of the waste side of the water seal, and then all such vents should be taken off at 45 degrees. Crown vents should not in any case be allowed these days, yet no mention is made of disallowing crown vents. If a vent is further away from the waste side of the seal than the cubic area of the tray contents when trap is standing sealed, the vent becomes ineffective, because syphonic action is maintained too long, which results in the water being all drawn out of the trap. So in that case to have a vent as far as 2 feet away from trap is altogether impractical.

Abutting Sink and Tray

Section 680.—When a sink and a wash tray abut on one another and they are practically one fixture and are in the same room, then they or it may be served by one.

The above section is O. K. with one exception. It would have been more complete had it included double laundry tubs, thus making the section complete.

(Continued in next issue.)

THE SANITARY ENGINEER

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DECEMBER 1, 1915

MAKING HISTORY

IN the year 1913 The Canadian Institute of Sanitary Engineers held their first convention. They pledged themselves to work hard, honestly and earnestly toward the general uplift of the trade. The incipient period of the Institute's existence up to April, 1913, was what might modestly be termed a period of "roughing in" and when the second convention came around, the test was put on in the Empire Auditorium, Edmonton. Those who read the report which appeared in the Sanitary Engineer about that time will acknowledge that no "sand holes" or cracked hubs could be found in the year's work. No, those two years, 1913-14, were a real beginning.

The president, James Smith, reminded those members present of what the Institute had come into being for when he said in his address:

"At our meeting in Winnipeg a year ago we pledged ourselves to hand together and work for the uplift of the plumbing trade in general, and the standardization of both material and construction of plumbing work, all tending towards the preservation of public health, which, after all, is the important factor in the aim of all sanitarians."

That was a solemn pledge and those who read the reports of 1914 know full well that the first pages of real history were recorded as a result of their year's work.

More than a year has passed since this Institute held its last convention. The country being at war, business conditions in the West and many other minor matters resulted in the 1915 proposed convention being postponed. But such a step did not by any means stay the hands, hearts and minds of the members. A great deal of research work has been done, the result of which appears in this issue, and from reports to hand, we understand there is more yet to come.

No sanitary engineer can afford to merely glance over this work. It will be easily realized as being work of a very important nature. It will mean thousands of dollars saved in soil pipe, as well as other material and time, beside making real history and at the same time giving to the trade throughout this whole Dominion, some real, practical data. We strongly urge the readers of the Sanitary Engineer to study this article.

"DUST"

IN this issue there appears an article under the heading of "Sanitary Science Course" which should be particularly interesting to every sanitary engineer in the trade.

In this article, Mr. Seymour shows the important part which the sanitary engineer can play in our social life. Both tuberculosis and pneumonia are discussed, and both can, to a great extent, be minimized by having proper sanitary appliances installed in every home. Quoting from the article where dust is spoken of, we read "that tubercle bacilli are contained in the various discharges of the patient, but especially in the sputum, the matter coughed or spit up by a consumptive. This sputum when spit upon the floor, wall, street or elsewhere gets on boots and clothes and then on the hands and eventually to the mouth. If the sputum dries it floats in the air and the dust particles may contain thousands of bacteria which find entrance to the lungs with the air breathed. Dust in a room or covered conveyance is more dangerous than dust out of doors, where many of the bacteria are soon killed by strong sunlight, heat and rain. Infection may occur by swallowing food on which dust containing tubercle bacilli has settled; or the food may be infected from cups and spoons used by a consumptive."

Now, in view of the fact that dust is so dangerous, it becomes the plain duty of every sanitary engineer to look into the matter and endeavor to show every prospective customer the need of keeping a home, office or factory free from dust.

This can only be done by bringing into use a stationary vacuum cleaner.

It has been argued that 90 per cent. of the dust in a home is due to shaking the furnace or cleaning it out, that almost every basement is a veritable dust mine. This assertion is no doubt true, but why is the basement a veritable dust mine? Simply because nine-nine and nine-tenths of the homes have no stationary cleaner to keep the basement dustless. A modern stationary cleaner does not mean a something to keep carpets and floors clean which are situated above the basement, but something which will keep clean the basement also. The very dust out of the ashes from the furnace can be collected with a modern stationary cleaner, and those manufacturers who are selling machines which will not keep the basement just as clean as any other part of the house have no right to try and sell machines which only half fill the requirements necessary.

Just imagine how easily it should be for a live sanitary and heating engineer to increase his business by showing a customer that even the dust from the furnace can be cleaned up by a stationary cleaner, and just imagine the good, sound missionary work a sanitary engineer is doing if he can make a house, office or factory dustless, particularly when we know by actual facts that dust is the direct cause of hundreds of deaths evry year.

THE FINISHED PRODUCT.

WHEN a person, or number of persons begin to make anything, they have in mind a finished product. And, involved in the process are at least three things: labor, raw material and the finished article. The first two can almost be brought under one heading, that of raw material, but the finished product can only come under one head as implied.

Now, it is a well-known fact that high-class goods cannot be made from low-grade, raw material and labor. Both must be high-grade, if the finished product is to be high-grade, that is in 99 cases out 100. But, it is a very easy matter to use good raw material and good labor and yet have a low-grade piece of goods if the material and labor are misapplied.

Billy Sunday gave several very interesting lectures on behalf of the cause of temperance in Toronto recently and some of his sayings were very witty, some crude and certainly not fit for the ears of our rising generation. But in one instance Mr. Sunday gave a good illustration. He said: "When you take raw material, be the kind whatever it may, and you turn it into a finished product, that product is worth more than the raw material or should be, or else the process by which the change from raw material to finished product was effected should not be resorted to." Mr. Sunday then pictured a row of boys, and said: "Here is the raw material which keeps the brewery going. Is their finished product in any way improved? If it is, then make every house a brewery. But you know my good people that the finished product of the breweries fills our prisons, insane asylums, industrial farms and work-houses, etc., and therefore the brewery has no right to its existence." The same argument applies in every business. If the finished product is not of far greater value, of far greater usefulness, then the factory or workshop in which these products are made has no right to exist, and those who traffic in those products are just as disreputable as the brewer or his employees. The latter, however, are not as much to blame as the former, because if there were no breweries or distilleries in existence, the labors of their present employees would be turned to more useful service.

The same argument can be applied to the manufacturer of inferior, cheap lines used in the sanitary and heating business. Four-fifths of the repair work is a direct result of grade goods, and such repair work is a curse to progress. Some small-minded person may argue that if it was not for repair work these days there would be no business at all coming to those engaged in the sanitary and heating trade. But such foolish arguments might easily be met by saying: "Well, if such is the case, why close breweries and distilleries?" Because of the fact that it would throw all those engaged in attendance at insane asylums, prisons, etc., out of work; and the number of police employed could easily be cut down to half its number were it not for the existence of the brewery.

As regards the goods used in our line, 90 per cent. of the material is valuable material, it must be of such a nature that, if inferior, it would not cost very much to bring it up to standard. The labor which goes into even the lowest grade of goods, is skilled labor, requiring just as high a grade of machinery to turn it out. Therefore it is good material and good labor misapplied. Malt and hops are good materials: brewery machinery is good machinery: ale bottles are good material: lumber going into cases is good lumber: the labor going into all these things is good labor misapplied; and apart from the prison and insane asylum business, all these commodities are misapplied. Now, what is the remedy? Simply this, don't buy the finished product. Don't be persuaded into thinking you can get a high-grade article for a low price, don't think because to some extent all men are alike from the outside, that they are all wholly alike, because, reader, you know different. But, one thing you do know, that you can't hire the best workman in your trade for the price of a less practical workman. In conclusion, let us remember these facts. The manufacturer of low-grade goods never installs them in his own home, neither does the brewer employ his own finished product.

EDITORIAL BRIEF

GOOD WORK, good material and good workmanship will give good service and will be remembered.

Interesting Pipe Terminal Experiment

The Canadian Institute of Sanitary Engineers Give to the Profession the Result of Their Last Winter's Work—The Pipe Terminal Question is One Which the Trade, as a Whole, Are Apt to Ignore, Which Should Not be the Case, as Experience is Proving Every Day

AT the Edmonton convention in 1914, we had a lengthy discussion on the question of "Pipe Terminals," which resulted in the convention adopting the method of having the increaser conform as near as possible to the pitch of, and projecting not more than 3 in. above the roof. This method was immediately afterwards adopted by Winnipeg and a large number of terminals have been constructed in this manner in the past year and a half. During the discussion at Edmonton the experiments carried out by our local committee with accompanying charts and photos were favorably commented upon and were largely responsible for the conclusions arrived at, the idea of having the terminal conform with the pitch of the roof emanated from Saskatoon.

It was further resolved that experiments continue to be carried out during the winter months, taking into consideration the velocity, temperature and humidity of the air passing through the stacks with a view of obtaining more scientific data on the subject.

In compliance with that resolution the committee have taken observations of the different types of terminals during the winter of 1914 and 1915. Unfortunately for our purpose the weather has not been so severe as it was the previous winter, there being only eight consecutive days when the thermometer did not register above zero, although we had the satisfaction of observing how the terminal cut close to the roof (Fig. 3) worked with a heavy fall of snow on the roof.

In taking observations we have confined ourselves principally to the terminals on the roof of the Grain Exchange Building because of the fact that we have samples of all the different types of terminals on that one roof, and have used the anemometer for registering the velocity, and the thermometer to find the temperature of the air passing up or down the various pipes. We could not get a hygrometer sufficiently small to go inside a 4 in. pipe, and have therefore failed to take any readings of the humidity of the air as suggested at the convention. In connection with these observations, charts of the principal stacks have been prepared showing the maximum and minimum temperature, the temperature of the air inside the stacks,

No. 32.—Hoar frost on roof terminal on Grain Exchange Building, Winnipeg, January 30, 1915. (See Charts).

the velocity of the air passing up or down inside the stacks and the size of the vent opening at the time of observation.

In the building referred to and which is eight stories in height, there are three connections from the drains to the city sewers as shown on plan. One of these has a house-trap with a fresh air inlet installed while the other two are straight connections with no trap.

From the readings taken we find that the placing of a house trap on the system results in the temperature of the air passing through the stacks being on an average about 6 degs. lower than in the stacks with straight connections to the sewers, due to the indraft of cold air at fresh air pipe. The temperature of the air in stacks when the trap is installed was found to average from 52 degs. to 60 degs. F., while with the straight connection it runs from 58 degs. to 66 degs. F. We also find that where there are a number of stacks passing through the roof off the same drain several of them have more or less continually a down draft, in some the air is almost still while in others the air is travelling at a high velocity upwards. Of course, when a fixture such as a closet is discharged you have the air current reversing for a little while and then reverting again to the old routine. In the stacks where there is a down draft the temperature naturally is lower than

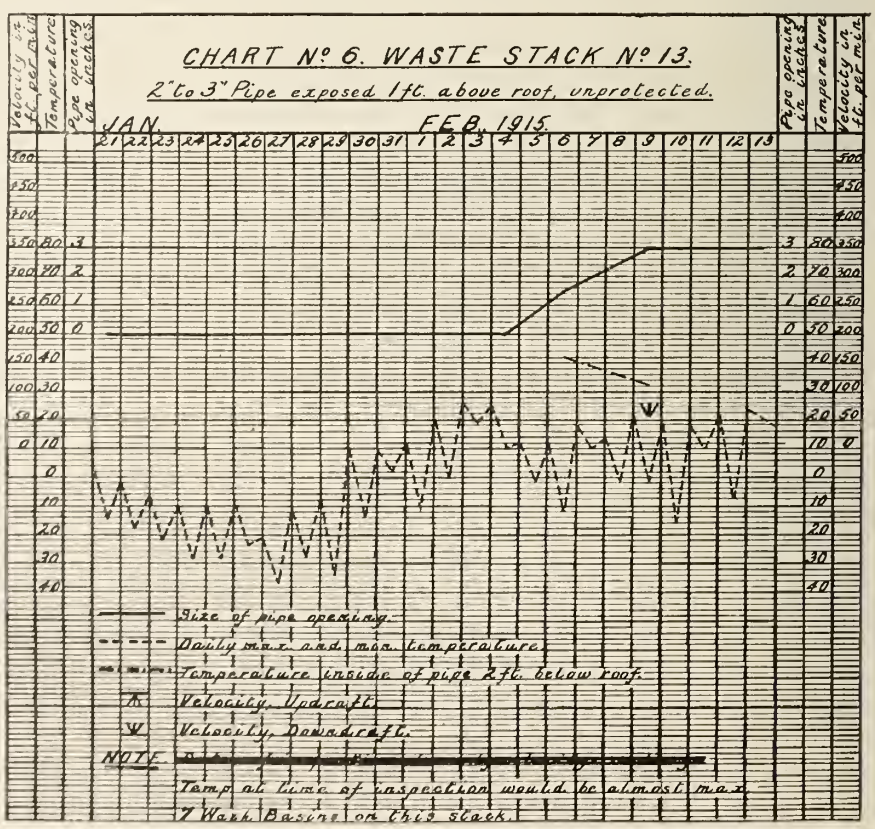


CHART No. 6. WASTE STACK No. 13.
2" to 3" Pipe exposed 1 ft. above roof, unprotected.
JAN.
FEB. 1915
Velocity in ft. per min.
Temperature
Pipe opening in inches
Size of pipe opening.
Daily max. and min. temperature.
Temperature inside of pipe 2 ft. below roof.
Velocity, Updraft.
Velocity, Downdraft.
NOTE
Temp. at time of inspection would be almost max.
7 Week Basins on this stack.

in the others. On the 29th of January when the outside temperature registered about 8 degs. below zero, the thermometer in one stack where the air was trav-

No. 8.—Hoar frost at roof terminal on Grain Exchange Building, Winnipeg, January 30, 1915. (See Charts).

elling at a velocity of 327 feet per minute downward registered 14 degs. F., while in another stack on the same drain with a velocity of 210 feet per minute upwards it registered 52 degs. F. In taking the temperature the thermometer was suspended inside the pipe about 2 feet from the top.

In comparing the different types of terminals the type adopted at last convention seems to give the best results. Taking basin stacks we find the old style of terminal as shown on Chart No. 6 being frozen solid when the temperature begins to register near zero and remaining in that condition until the temperature has risen above zero for a few days, while the new type of terminal as shown on chart No. 7 remained open even during in that condition until the temperature never rose above zero and dropped as low as 36 degs. and 38 degs. below zero with the exception of two of them that were more exposed than the others and which closed from 2 inches to 1 inch during the four days when the temperature never rose above 8 degs. below zero, but opened out again as soon as the maximum temperature rose above zero. During that time some of the terminals had a crest of ice formation about 10 in. to 15 in. high but still the opening was nevere less than the nominal size of the pipe. (See photograph attached to chart No. 7). On one terminal this crest took on a peculiar formation owing to its close proximity to a column, the top of it being turned over at right angles the opening being elliptical in shape.

On soil stacks we found similar conditions. On those terminals cut off close to the roof there were two that closed up from 4 inch to 3½ inch. (see chart No. 5) and one from 4 in. to 2½ in. during the four days of extreme cold while the remainer kept fully open all the time. All the 4 in. stacks increased to 6 in.

No. 28.—Hoar frost at roof terminal on Grain Exchange Building, Winnipeg, January 30, 1915. (See Charts).

with no protection and projecting 1 ft. above roof were frozen up or nearly so all the time of the extreme cold (see chart Nos. 9 and 10), with one exception, and that is attributable to the fact of it being placed on the same chase as the steam main which caused the temperature of the air in the stack to register as high as 90 degs., and even during the coldest weather as high as 78 degs. Another with packed roof casing and which is installed in a similar position gave the same result, the temperature always being about 78 degs., and yet with the high temperature the velocity of the air in these stacks never rises much above 200 ft. per minute, while in other stacks in ordinary conditions with the air at the average temperature we had velocity readings as high as 592 ft. per minute.

Chart No. 11 shows a 6 in. stack which is increased to 8 in. and unprotected. This stack in former years has always frozen solid during the extreme cold but this year only closed down to a 6 in. opening. On the 23rd January, two days after the maximum temperature had dropped below zero, it closed to 7½ in. and gradually closed up as the temperature went lower till at the end of the very extreme cold on the 29th January, there was a 6 in. opening, but immediately with the rise of temperature it gradually opened until the 2nd of February when all signs of ice formation had disappeared. This I think may be attributed to the alterations which have been made in the building during the year. This stack formerly took the discharge from the main lavatories on the fourth

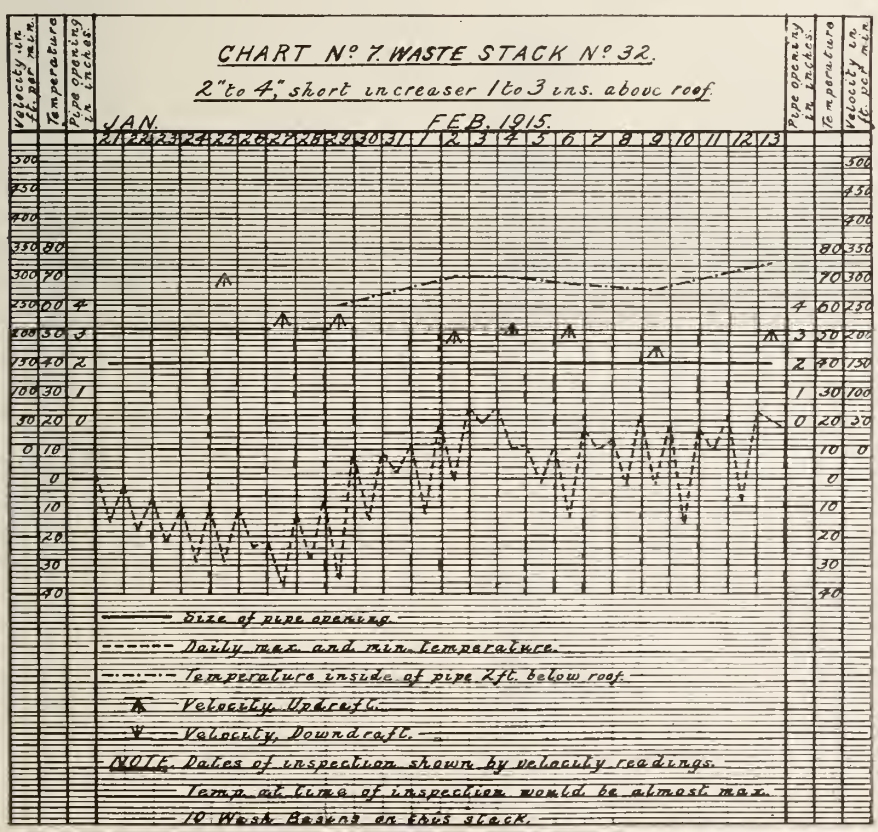


CHART No. 7. WASTE STACK No. 32.
2" to 4" short increaser 1 to 3 ins. above roof
JAN.
FEB. 1915.
Velocity in ft. per min.
Temperature
Pipe opening in inches.
Size of pipe opening
Daily max. and min. temperature.
Temperature inside of pipe 2 ft. below roof
Velocity, Updraft.
Velocity, Downdraft.
NOTE. Dates of inspection shown by velocity readings.
Temp. at time of inspection would be almost max.
10 Wash Basins on this stack.

See illustration No. 32. Above cut describes terminal shown.

and fifth floors, and in doing so was divided into one 6 in. and two 4 in. stacks. Owing to the alterations recently made these two 4 in. tributary stacks are done away with, thereby converging all the air into one stack, with the result that we have an opening of 6 in. at a time when it was frozen under similar conditions last year, which I think is a strong argument for having as few pipes through the roof as possible and thereby help to minimize the freezing over of the stacks.

One point which was demonstrated to our satisfaction: was the effect which a heavy fall of snow would have on those pipes which terminate 1 inch to 3 inch. above roof. Before the extreme cold set in we had a heavy fall of snow covering the roof in some parts from 12 in. to 18 in. deep yet we found where a pipe came through the roof the snow opened out in convex shape from the top of the pipe and after eight days of below zero weather ice formation had formed on top of the snow round some of the pipes varying in height from 4 in. to 12 in., but still with a clear opening through the ice formation fully the size of the pipe, which clearly shows that a fall of snow would have little or no effect on these terminals. These observations have all been taken on a flat roof.

Regarding the pitched roof terminal, while we have not taken readings of the velocity and temperature of the air in these we have had under observation several of the new type of pitched roof terminals and in all cases we found them to be satisfactory as compared with those of the older style. There were two that were watched more particularly, they were placed in an angle of the roof exposed to the sweep of the north-west wind, and in both cases there was a slight formation of ice on the top of the pipe but still the opening was more than 4 in. the nominal size of the pipe, while in the same district some terminals placed in a similar position with packed roof cap on them had ice formation about 12 in. to 15 in. high, and were more or less completely closed up. There were others in the same district that were facing the north but apart from a thin white coating round the ring in the hub were perfectly clear during the extreme cold weather. Others facing the east and south showed no signs of frost at all. All these were on plumbing systems where the house-trap was installed, what effect, if any, the omission of the house-trap would have we can't tell, but from the readings taken on the flat roof we think there would be very little difference.

Before closing there is one point in connection with the installation of these terminals which we think would be beneficial. Complaints have been made regarding the difficulty encountered in caulking the ring into the bevelled hub and we would recommend that the hub part of the terminal be kept level with

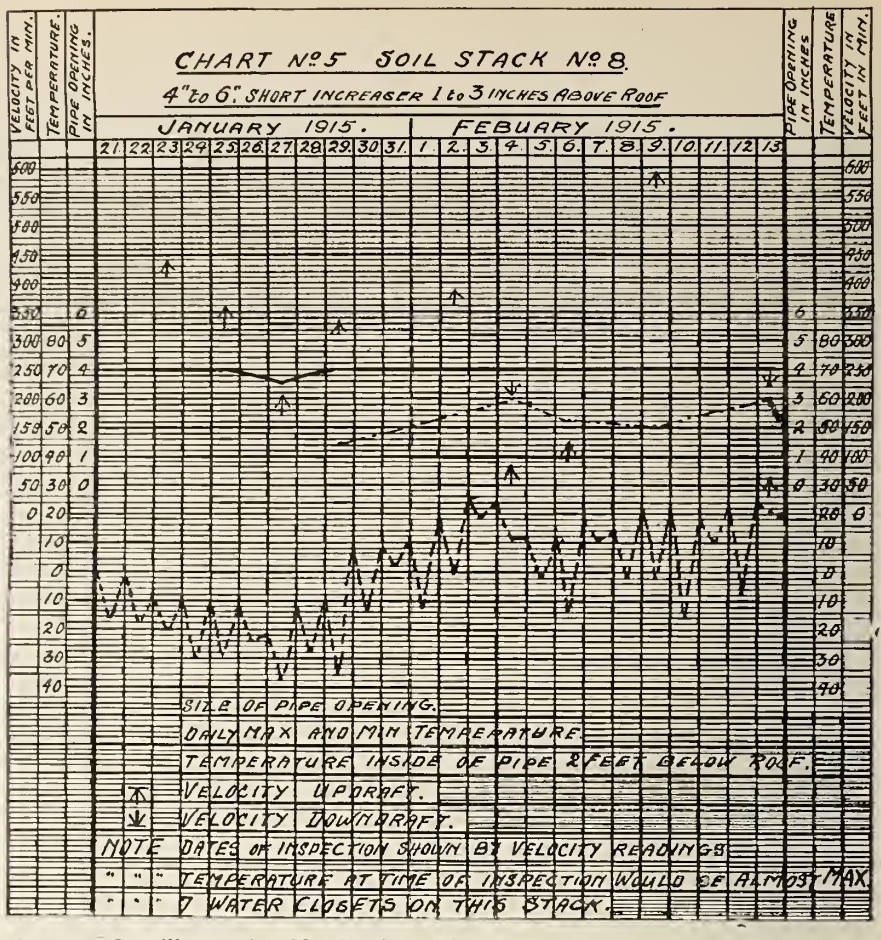


CHART No. 5 SOIL STACK No. 8.
4" to 6" SHORT INCREASER 1 to 3 INCHES ABOVE ROOF
JANUARY 1915.
FEBUARY 1915.
VELOCITY IN FEET PER MIN.
TEMPERATURE.
PIPE OPENING IN INCHES.
PIPE OPENING IN INCHES
TEMPERATURE
VELOCITY IN FEET IN MIN.
SIZE OF PIPE OPENING.
DAILY MAX AND MIN TEMPERATURE
TEMPERATURE INSIDE OF PIPE 2 FEET BELOW ROOF.
VELOCITY UPDRAFT.
VELOCITY DOWNDRAFT.
NOTE DATES OF INSPECTION SHOWN BY VELOCITY READINGS
" " " TEMPERATURE AT TIME OF INSPECTION WOULD BE ALMOST MAX.
" " " 7 WATER CLOSETS ON THIS STACK.

See illustration No. 8, above chart describes terminal shown.

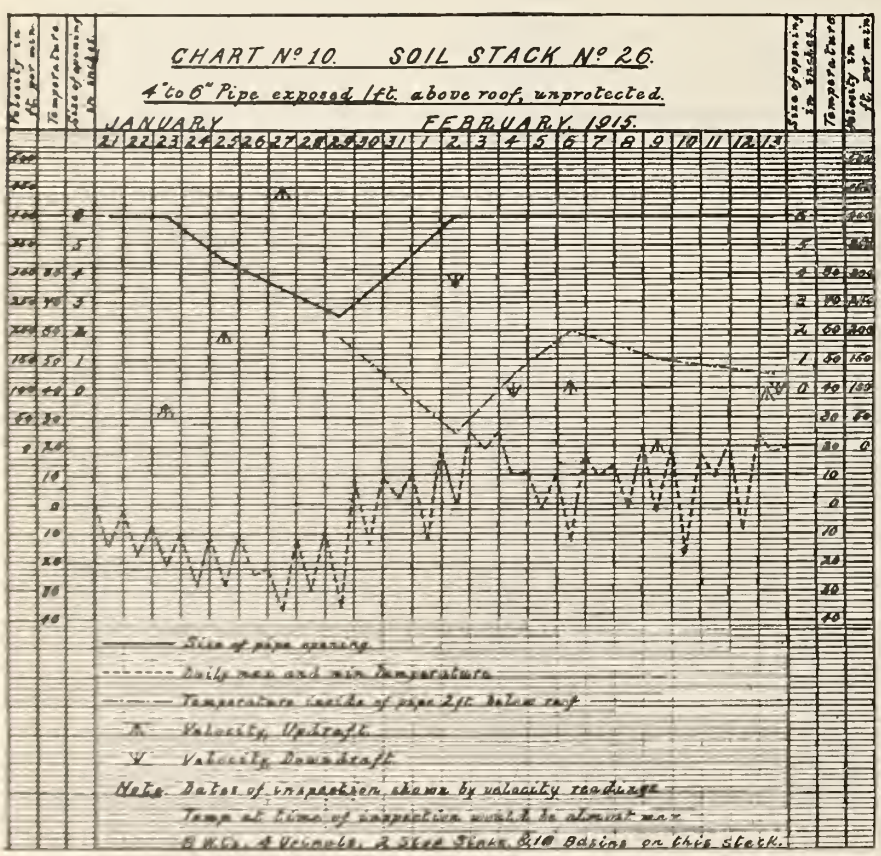


CHART No. 10. SOIL STACK No. 26.
4" to 6" Pipe exposed 1ft. above roof, unprotected.
JANUARY FEBRUARY 1915.
Size of pipe opening
Daily max and min Temperature
Temperature inside of pipe 2 ft. below roof
Velocity Updraft
Velocity Downdraft
Note. Dates of inspection shown by velocity readings
Temp at time of inspection would be almost max
8 W.Cs. 4 Urinals, 2 Slop Sinks, & 10 Basins on this stack.

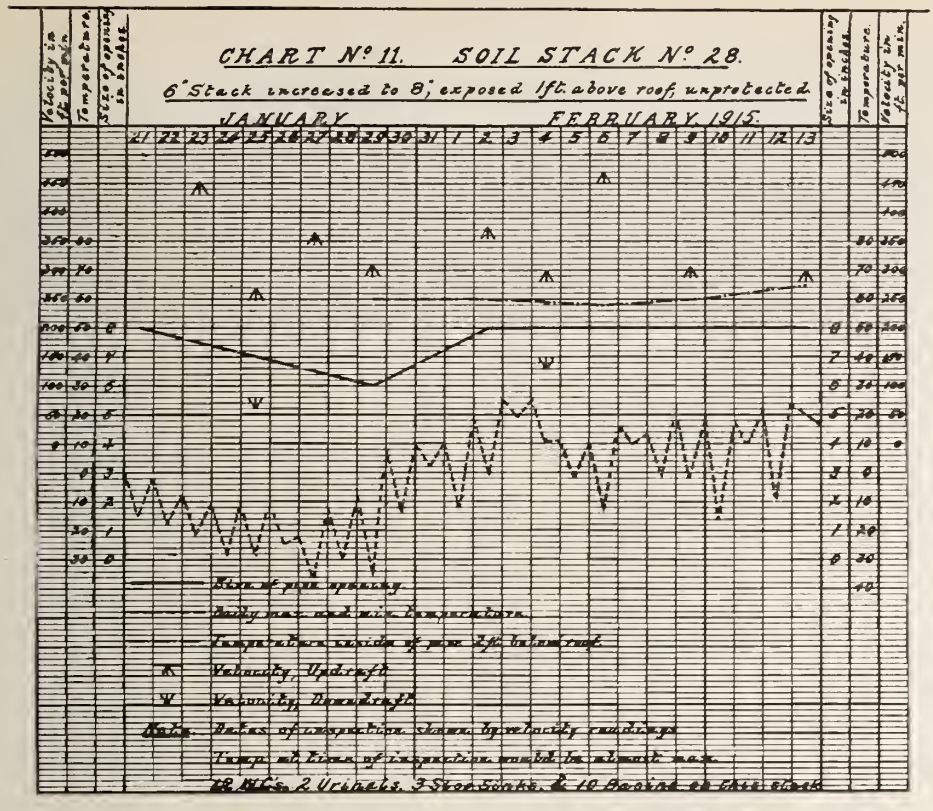


CHART No 11. SOIL STACK No 28.
6" Stack increased to 8", exposed 1ft. above roof, unprotected.
JANUARY
FEBRUARY 1915.
Size of pipe opening
Daily max. and min. Temperature.
Temperature inside of pipe 2ft. below roof
Velocity, Updraft
Velocity, Downdraft
Note. Notes of inspection shown by velocity readings
Temp. at time of inspection would be almost max.
12 W.C's. 2 Urinals. 3 Slop Sinks. & 10 Basins on this stack

See illustration No. 28, above chart describes terminal shown.

the roof and that the ring be 1 in. or 1½ in. longer than the depth of the hub, thereby having a smaller margin for the formation of ice to rest upon, and that for pitched roof terminals this ring should have a bead cast on the end similar to the spigot end of a pipe which would help to prevent the ring from jumping out of position when caulking the joint.

The accompanying charts are selected from those prepared for the purpose of showing the results in stacks placed under similar conditions but with different types of terminals.

Charts Nos. 6 and 7 illustrate conditions on basin stacks.

No. 6 has seven wash basin discharging into it, and is increased from 2 in. to 3 in., 2 ft. under the roof and terminates 1 ft. above roof with a single casing of sheet iron round it. (See Fig. 1.) No. 7 has ten wash basins discharging into it and is increased from 2 in. to 4 in. at roof level, by means of a short increaser terminating 2 in. above roof and flashed with sheet lead. (See Fig. 3.) You will see from the charts that while No. 6 was frozen when we started taking observations on the 21st January, at which time the maximum temperature had dropped to 1.9 degs. F., and remained in that condition until the 4th of February, six days after the maximum temperature had risen again above zero, and gradually opened up to 3 in. as the temperature increased. No. 7 kept its full nominal opening all that time.

Chart Nos. 5, 9 and 10 illustrate condition of soil stacks.

No. 5 is a 5 in. stack having no fixtures on it till it reaches the eighth floor where it divides into two 4 in. stacks, which are carried separately through the roof terminating 2 in. above roof with a short 4 in. to 6 in. increaser. (See Fig. 3.) Stack shown on No. 5 is one of these stacks and has a battery of seven water closets discharging into it. Nos. 9 and 10 start as one 4 in. stack dividing into two 4 in. stacks on fourth floor which are extended separately through roof being increased to 6 in. 2 ft. below roof and terminating about 15 in. above with no protecting casing. Into these stacks there discharges in all eight water closets, four urinals, two slop sinks and ten basins. From the charts you will see that No. 5 with the exception of closing from 4 in. to 3½ in. during the very extreme cold kept open all the time. No. 9 was closed from 6 in. to 5 in. on 21st of January at the start of our observations and gradually closed until it was frozen over on 27th January and remained closed until the 2nd of February when, the minimum temperature rising above zero for three days caused it to show a full opening on the 4th February when the temperature took another drop closing it down to 5 in. again on 6th February, after which it gradually opened out with the rise of the temperature. No. 10 was fully open until the maximum temperature dropped below zero when it gradually closed down until the 29th January, when the temperature was at its lowest, it had closed down to 2½ in., when, with the rise of the maximum temperature above zero it opened out until the 2nd of February, when the minimum temperature had risen above zero it had a full 6 in.

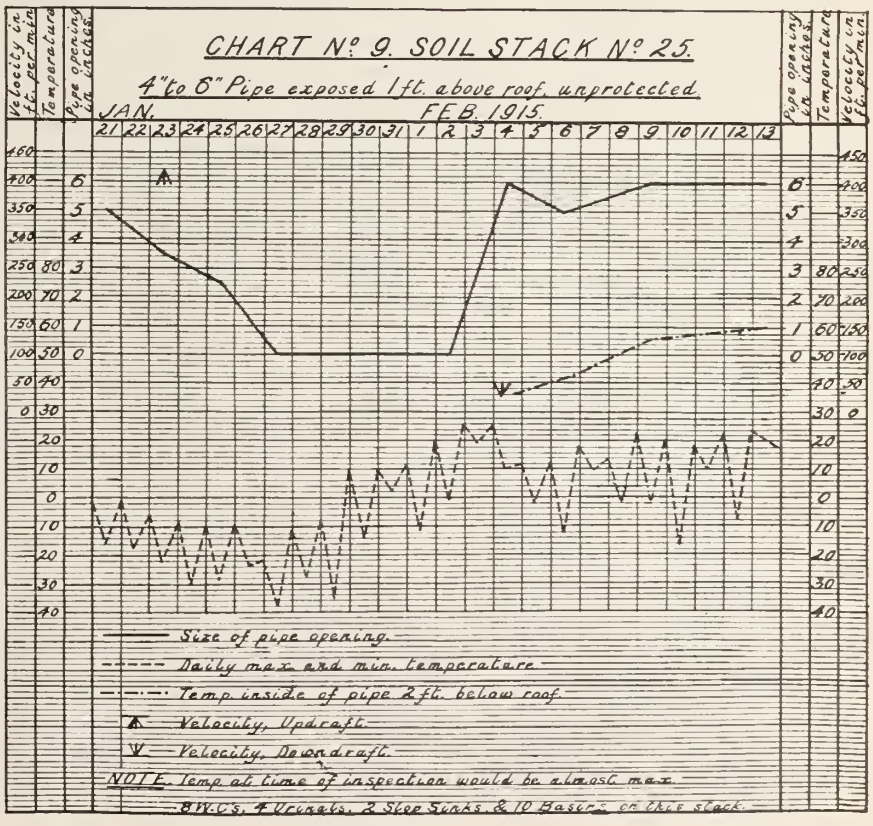


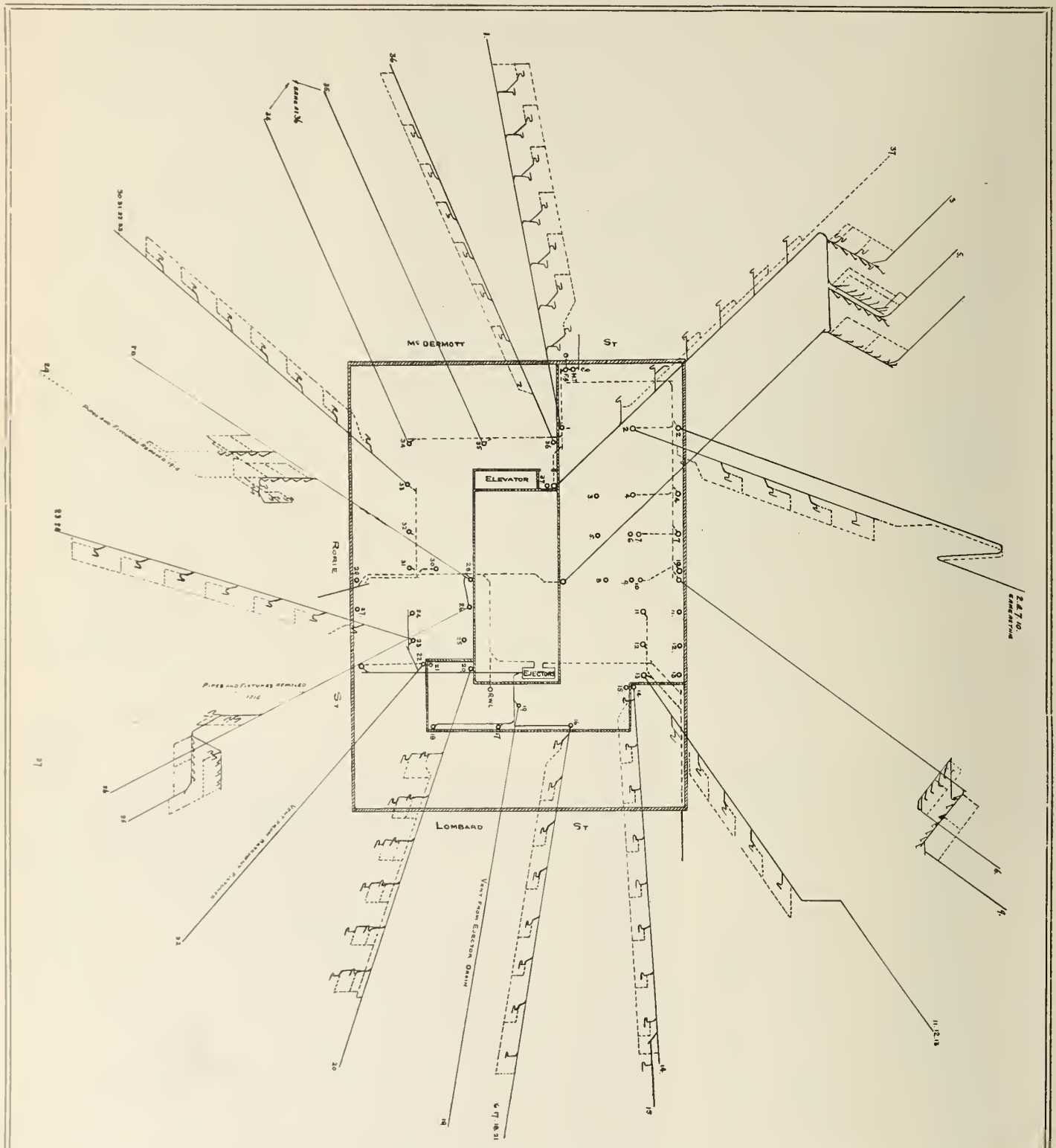
CHART No 9. SOIL STACK No 25.
4" to 6" Pipe exposed 1 ft. above roof, unprotected
JAN.
FEB. 1915.
Size of pipe opening
Daily max and min. temperature
Temp inside of pipe 2 ft. below roof
Velocity, Updraft
Velocity, Downdraft
NOTE. Temp at time of inspection would be almost max.
8 W.C's. 4 Urinals. 2 Slop Sinks & 10 Basins on this stack

opening and remained thereafter in that condition.

From the observations taken we make the following deductions, viz.:

1st. That the terminal conforming to the pitch of the roof and projecting no more than 3 in. above roof level gives the most satisfaction in reducing the trouble arising from frost closure at least to a minimum, if not doing away with it altogether.

2nd. That the hub of the terminal



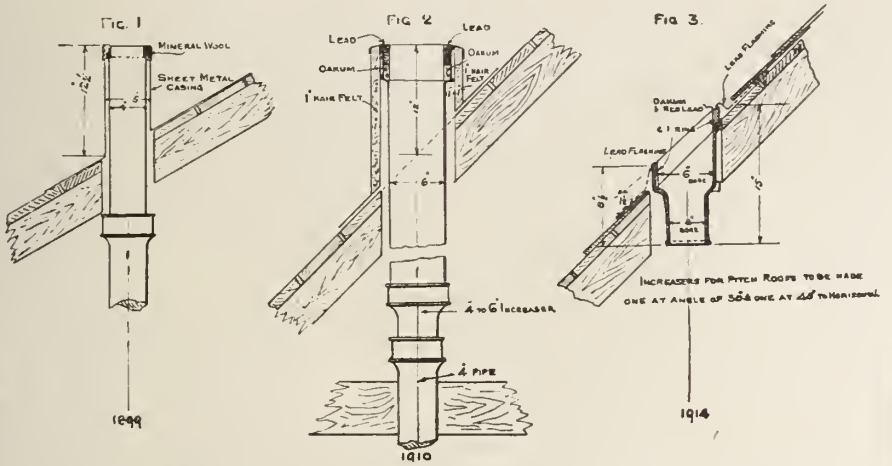
Plan of drains and elevation of soil pipe and vent stacks, Grain Exchange Building, Winnipeg, March, 1915.

It will no doubt interest the readers of the Sanitary Engineer to know that a number of experiments on pipe terminals were made during the winter of 1913 and 1914. These were described in the Sanitary Engineer in the April and May issues of 1914. More experiments will be described in connection with other matters of interest in the Sanitary Engineer at an early date.

The Canadian Institute of Sanitary Engineers are to be complimented upon this very valuable data which cannot fail to be appreciated by every earnest sanitary engineer.

should finish flush with the roof and that the ring be made 1½ in. longer than the depth of the hub and thereby have a small margin for the ice formation to build upon.

3rd. That as far as possible the number of vent terminals in any one building be reduced to a minimum by re-connecting vent lines to main stacks.



The evolution of the soil pipe terminal in the Western Provinces

"YOUR COMPETITOR"

By Professor Arthur Bateman, Director Anglo-American Sanitary Correspondence College, Chicago

Prof. A. Bateman

Christmas is fast approaching and soon your strongest and most heartfelt associations will be awakened.

During this festive season every ounce of benevolence and geniality in your hearts rises to the surface and you find pleasure in gladdening the hearts of those in less prosperous circumstances by extending them a kind word or small pleasantry which makes everything in their vicinity to freshen into smiles.

Assuredly, this is the time of year when your hearts are overflowing with generous and happy feelings, even towards your competitor.

The whole atmosphere is diffused with peace and good will, rivalry is a nonentity and you grasp the hand of your competitor and wish him all the joy and happiness in the world.

If you could have but one continual Christmas, would not the world be an ideal place for you and others to live in? Right away you would eliminate your own personal feelings and realize that because your competitor has views dissimilar to your own, it does not necessarily follow that he is offering you a challenge to eternal disagreement.

You would quit wrangling over trivial matters, and business would be settled speedily, logically, efficiently, and in the best interests to the majority.

The whole-hearted spirit predominant in you at this time makes you realize that your competitors are men of widely different degrees of ability, yet it is absolutely imperative that you confer on all-important association matters with them, and if you are really prosperous, generous, and endowed with abundant brain power, your personality will make those of lesser ability feel at ease.

You know you are a long way short of the ideal yourself, so pick the mote out of your own eye and don't wound the feelings of your competitors, who may not be blest with such a flourishing business as your own, or disparage his work at any time.

Ethics are just as imperative among you as among the medical fraternity, so always give your competitor credit for what attainments he possesses.

Right now, you can only see beauties and goodness instead of defects. If criticism is necessary during this period your criticisms are less destructive and more constructive than formerly.

Again all the petty differences and jealousies which often dim your vision are banished, and you look upon competitive merit as the best basis for business. You follow the teaching of that book of books and love your enemies. Master minds have expressed the opinion that competitive enemies are your greatest assets, but it is not so for the mere term is repulsive in itself, and you and your competitors need more closely welding together.

You know, if disaster occurs, or sudden calamity befalls a family you loosen your purse strings spontaneously and with great good will. Such catastrophes make you realize that you are exposed to a thousand accidents and bring home very forcibly the fact that sooner or later you cannot do without the assistance of others.

The goodness in your heart may lie dormant most of the time but it reposes there continuously and only needs a time like Christmas or a streak of ill luck to make this beautiful trait in your character surge to the surface.

Honest and spirited competition is the spice of trade and the advantages the public derive from such are multitudinous. Moreover, the self-satisfaction produced by success under such circumstances are most gratifying to you.

Notwithstanding, harmony must prevail, and as the continuous and uniform rhythm of a note on the violin is capable of demolishing a colossal bridge so will this suggested harmony with your competitors make all the seemingly stupendous stumbling blocks ahead of you, sink into oblivion.

Let the good will you bear your competitor just now survive for all time and ideas will be exchanged more freely than in practice, and knowledge and good fellowship will be more widely disseminated to the betterment of all in our glorious trade and profession.

LOYALTY

Loyalty is that quality which prompts a person to be true to the thing he undertakes. It means definite direction, fixity of purpose, steadfastness. Loyalty supplies power, poise, purpose, ballast, and works for health and success. Nature helps the loyal man. If you are careless, slipshod, indifferent, Nature assumes that you wish to be a nobody and grants your desire. Success hinges on loyalty. Be true to your art, your business, your employer, your "house." Loyalty is for the one who is loyal. It is a quality woven through the very fabric of one's being, and never a thing apart. Loyalty makes the thing to which you are loyal yours. Disloyalty removes it from you. Whether any one knows of our disloyalty is really of little moment, either one way or the other. The real point is, how does it affect ourselves? Work is for the worker. Love is for the lover. Art is for the artist. The menial is a man who is disloyal to his work. All useful service is raised to the plane of art when love for the task—LOYALTY —is fused with the effort.

Practical Course for Sheet Metal Workers

ARTICLE No. 26 OF SERIES

By CHARLES SEIVERS

IN this issue is shown a round pipe which is to fit over a ridge of a roof and also how to develop the pattern for the pipe as well as the flange to fit the roof.

Fig. 1. A-B-C-D-E shows a side view of pipe fitting over section of roof. On line A-E draw a half section of the pipe as shown by the semi-circle A-F-E. Divide this section into any number of equal portions as shown by 1, 2, 3, 4, 5, etc. From each of these points draw lines at right angles to A-E, extending them until they intersect the roof line at B-C-D. Now turn to Fig. 2. To lay out the pattern for the pipe piece draw the two parallel lines G-G. and H-H. at either end. Next draw a line at right angles joining G-G to H-H as G-H. From this point on G-G and H-H set off the divisions in half section A-F-E repeating to make circumference complete, commencing at division 1 measure from the line A-E to where it joins the lines B-C-D, in this case from A to B, and set off on one end of stretchout or division marked 1, Fig. 2. Next measure distance on line drawn from point 2, and set off on next division on stretchout. Repeat in the same manner until last division at E is set off. This will give one-half the pattern. To complete the pattern of the pipe, measure off the distance on each of the lines working back toward the starting point that is the point at E, Fig. 1, or number 11 in Fig. 2, thus completing one half of the layout.

Next measure distance on line from point 10, then from point 9, and continuing until point one is again measured and set off. A line drawn through the points thus obtained on stretchout will give outline of **pattern** of pipe.

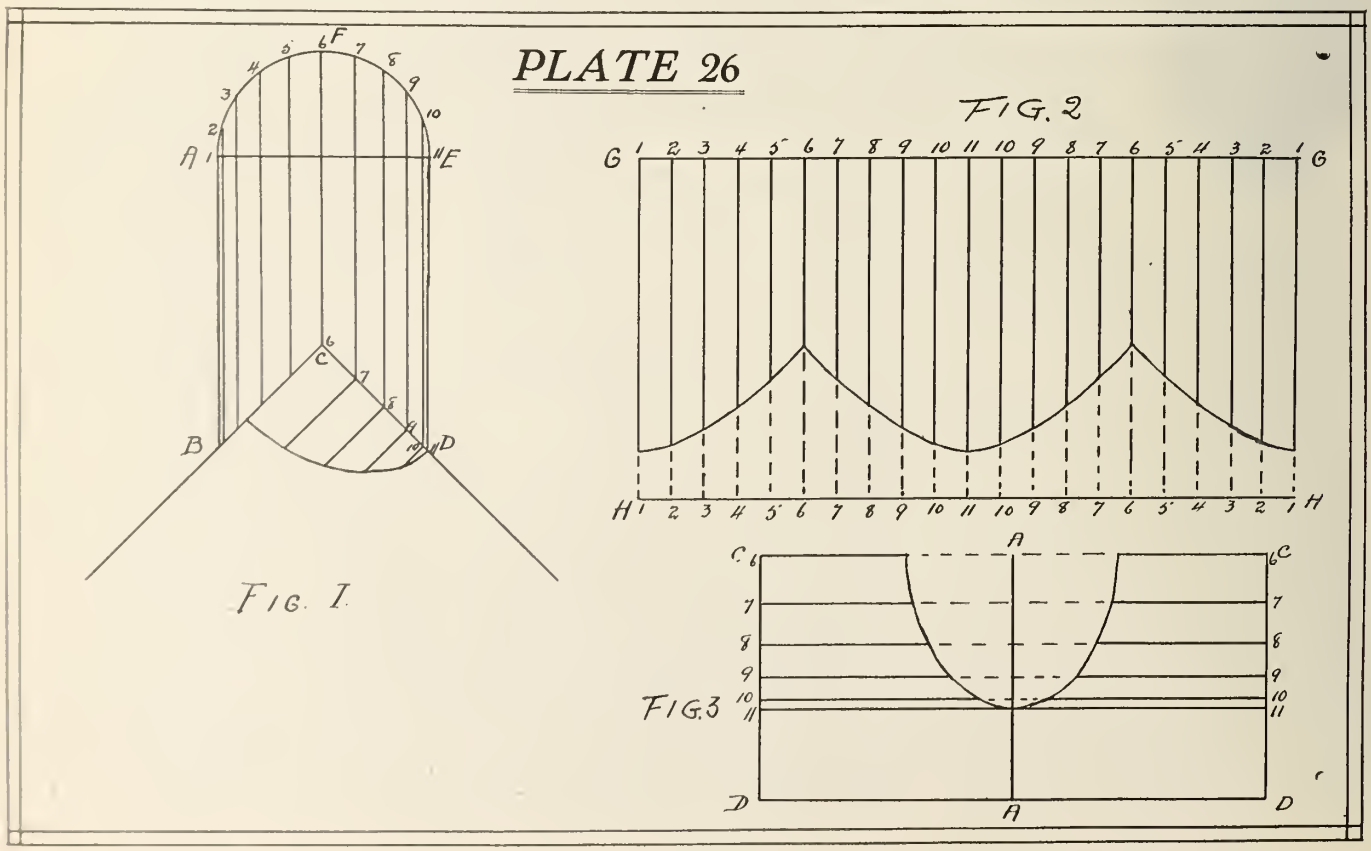
On C-D, Fig. 1 is shown a section of the opening in flange to receive pipe. From each of the points on C-D draw lines at right angles as shown, and on these lines from C-D set off the distance from A-E to the point on circumference which the line is drawn from. The distance from A-E to point 6 being set off on line drawn from C or 6, and from A-E to 7, on line from 7 at C-D, repeating others in like manner.

A line drawn through these points gives outline of opening. In Fig. 3 is shown a pattern for one-half the flange, now draw the outline of the flange as C-C-D-D, on these lines C-D at each end, set off the spaces on the line C-D in Fig. 1. In the centre of the flange and parallel to C-D draw a line as A-A and on each side of A-A set off the outline of opening as described at C, 6, 7, 8, 9, 10, 11 D Fig. 1.

Allowance must be given for seams, at points, G, G, H, H, in Fig. 2.

Don't imagine that your bank is not familiar with the true character and conduct of your business. It has diversified means of obtaining information.

It is one thing to get a job, quite another to keep it. Almost any of us can accomplish the former; but few of us in the broader sense hold down our jobs to our own mental and spiritual satisfaction. To keep forever the initial enthusiasm, the first glow of pride in our work; to retain the glamor, and never lose the dream of high endeavor—these are the difficult things to accomplish, and not many of us come out triumphant.

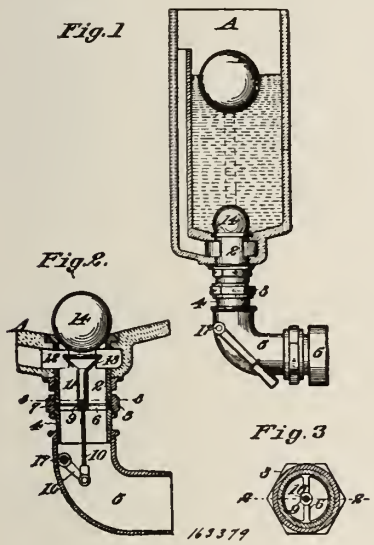


New Canadian Patents

No. 163,379. Flush Mechanism.

David Gibbs, San Francisco, California, U.S.A., 22nd June, 1915; 6 years. Filed 23rd March, 1915. Receipt No. 249,626.

Claim.—In combination with a tank having a discharge and a tube therein, a spider connected to the tube, a rod slidable in the spider, a ball, a ring to support the ball, an interiorly threaded collar having its base seating on top of the spider, spaced divergent arms connected to the collar and ring, a rod slidable through the spider and threadedly connected to said collar, a pivoted upwardly movable handle to actuate the rod, and means to operate the rod from the handle, said handle being limited in its downward movement by engagement of the collar with the upper face of the spider.



No. 163,173. Valve.

Maurice Frank Hutchison and Harvey E. Hanes, assignee of a half interest, both of Herndon, Virginia, U.S.A., 15th June, 1915; 6 years. Filed 15th March, 1915. Receipt No. 249,321.

Claim.—1. The combination with a casing having branch passages and a rectangular slot through which they communicate, of a valve provided with a tapering slot movable across the slot in the casing for varying the uncovered portion of the said latter slot.

2. The combination with a casing having branch passages and a rectangular slot through which they communicate, of a valve provided with a tapering slot movable across the slot in the casing for varying the uncovered portion of said latter slot, one edge of said tapering slot being level with one edge of said rectangular slot.

3. The combination with a casing having branch passages and a rectangular slot through which they communicate, of a valve having a tapering slot movable across the slot in the casing for varying the uncovered portion of the latter slot, a scale on the casing, a pointer attached to the valve and co-operating with the scale for indicating the position of the slot in the valve with respect to the slot in the casing, a fixed stop on the scale for engaging the pointer when the slot in the casing is closed, and an adjustable stop on the scale also adapted to be engaged by the pointer for limiting the opening of said slot in the casing beyond a predetermined extent.

4. The combination with a casing having branch passages, of a valve fitted in one passage and having a uniformly gradual substantially unbroken spiral edge arranged obliquely with respect to the other passage and extending from the lowest to the highest level thereof, and means for turning the valve to move its spiral edge across the latter passage, thereby uniformly varying the uncovered portion of said passage.

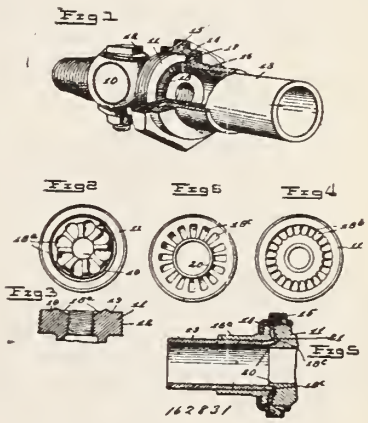
No. 162,831. Lead Pipe Connection.

The H. Mueller Manufacturing Company, assignee of Phillip Mueller and Anton C. Schuerman, both of Decatur, Illinois, U.S.A., 1st June, 1915; 6 years. Filed 30th December, 1914. Receipt No. 246,502.

Claim.—1. A coupling as specified comprising a head, a pipe, a sleeve for the pipe and a coupling nut securing said sleeve and said pipe to said head, said head having an interrupted flat surface for contact with said pipe whereby to prevent the turning of the same with respect to said head.

2. A coupling as specified comprising a head having a flat abutting face, and having projections on said flat face arranged at an angle to the circumference of the head, a soft pipe provided with a flange abutting at one end of said face, a flange sleeve for the end of the lead pipe, and a coupling nut carried by the head and engaging the said flange of the sleeve or the pipe to compress the same against the head whereby to embed said projections in the end of the pipe and retain the pipe from relative turning movement with respect to the head.

3. In a coupling as specified, a corporation cock having a head, a lead pipe provided with a flange abutting said head, a correspondingly flanged sleeve for the end of the lead pipe, a coupling nut on said head engaging said flange of the sleeve whereby to bind the same against the flange of the lead pipe and to compress the latter against said head, said head having a flat roughened surface for engagement with said pipe flange to prevent the turning of the pipe relative to said head.



4. A coupling as specified comprising a relatively hard member having a flat roughened abutting face, a relatively soft member, and a coupling device binding said members together to embed said soft member into the roughened abutting face of the hard member whereby not only to hold the members from longitudinal displacement relative to one another, but to also hold the members from relative rotary displacement.

5. A coupling as specified, comprising a head provided with a flat face having thereon a series of circularly arranged radially disposed projections, a lead pipe provided with a flange abutting said face, and a coupling nut to compress the flange of said pipe against said face.

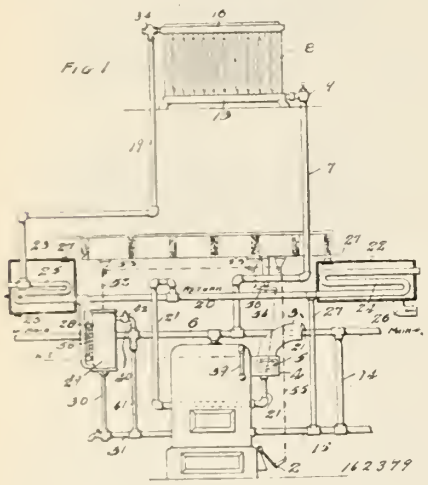
6. In a coupling as specified, a head provided with a flat face having a series of alternate projections and depressions circularly and radially disposed thereon, a lead pipe provided with a flange abutting said flat face, and a coupling nut to compress the flange of said pipe against said flat face.

No. 162,379—Steam Heating Apparatus

Thomas Joseph Cullen, Jersey City, New Jersey, U.S.A., 14th May, 1915; 6 years. Filed 21st December, 1914. Receipt No. 246,246.

Claim.—1. The combination with a boiler, its furnace, and smoke flue, of a steam radiator, a steam pipe communicating with the boiler and radiator, a return pipe from the radiator extending through the boiler furnace, where it is heated to cause circulation of air therein, and into the smoke flue, and means for controlling the passage of gases from the radiator to the return pipe comprising a screw plug forming a valve and having longitudinal tapered slots therein to control the passage therethrough of gases from the radiator.

2. The combination with a boiler, its furnace, and smoke flue, of a steam radi-



ator, a steam pipe communicating with the boiler and radiator, a return pipe from the radiator through the boiler furnace, where it is heated to cause circulation of air therein, and into the smoke flue, a condensing coil in the return pipe, and means for controlling the passage of gases from the radiator to the return pipe comprising a screw plug forming a valve and having longitudinal tapered slots therein to control the passage therethrough of gases from the radiator.

No. 162,459. Nipple Threading Machine

The Page Hersey Iron, Tube and Lead Company, Limited, assignee of Joseph Mosley, both of Guelph, Ontario, Canada, 11th May, 1915; 6 years. Filed 14th October, 1914. Receipt No. 244,013.

Claim.—1. In a nipple threading machine the combination with the threading chuck, of means for automatically chamfering the nipple end simultaneously with the threading operation, as and for the purpose specified.

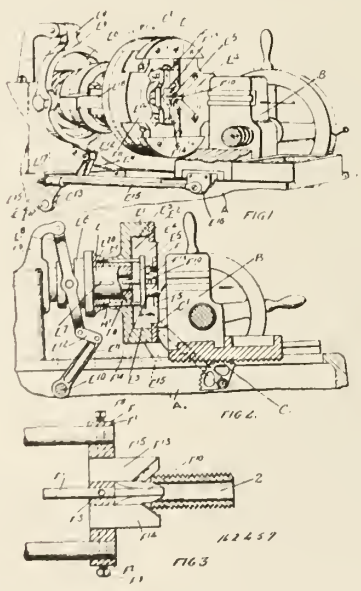
2. In a nipple threading machine, the combination with the threading chuck, of means for automatically reaming the nipple end simultaneously with the threading operation, as and for the purpose specified.

3. In a turning machine, a circular cutterhead body, a central reaming tool extending centrally therefrom, and chamfering tools located at diametrically opposite sides of the reaming tool, as and for the purpose specified.

4. In a nipple threading machine, the combination with the usual chuck carrying threading tools, of a reaming tool supported centrally within the chuck behind the threading tools and chamfering tools located at diametrically opposite sides of the reaming tool, as and for the purpose specified.

5. In a nipple threading machine, the combination with the usual chuck carrying the usual threading tools, of a supporting bar member located in the threading chuck diametrically behind the threading tools and extending diametrically across the centre of the chuck, a reaming tool secured centrally within the supporting bar member, and chamfering tools located diametrically at each side of the reaming tool, as and for the purpose specified.

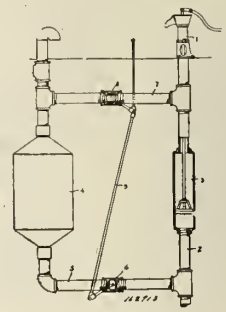
6. In a nipple threading machine, the combination with the usual chuck carrying the usual threading tools, of a supporting bar member slidably supported by the threading chuck directly behind the threading tools and extending diametrically across the centre of the chuck, a reaming tool secured centrally within the supporting bar member, chamfering tools located diametrically at each side of the reaming tool, and means operated by the sliding rear movement of the supporting bar member for automatically throwing the cutting tools of the threading



chuck out of operation, as and for the purpose specified.

7. In a nipple threading machine, the combination with the threading chuck suitably supported on a revolving spindle and the clutch member thereof, of a bar support having stems extending at right angles thereto in proximity to each end thereof slidably held within the chuck head and adapted to engage the clutch member when forced inwardly, and reaming and chamfering tools carried by the supporting bar member centrally behind the cutting tools of the chuck, as and for the purpose specified.

8. In a nipple threading machine, the combination with the threading chuck supported on a revolving spindle and the clutch member thereof, of a bar support having stems extending at right angles thereto in proximity to each end thereof slidably held within the chuck head and adapted to engage the clutch member when forced inwardly, reaming and chamfering tools carried by the supporting bar member centrally behind the cutting tools of the chuck, and longitudinally adjustable stops carried by the clutch member with which the stems engage when forced towards the clutch member by the inward feed of the work, as and for the purpose specified.



No. 162,913. Pump Mechanism.

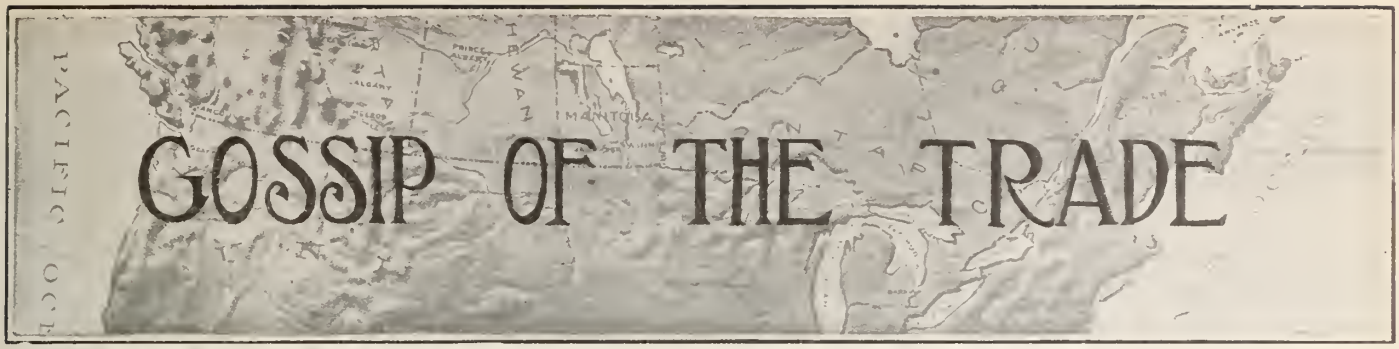
Henry C. Hogarth, Tillsonburg, Ontario, Canada, 1st June, 1915; 6 years. Filed 8th February, 1915. Receipt No. 247,772.

Claim.—1. In an atmospheric pressure water supply system, the combination with a pump, of a reservoir connected to the suction tube of the pump and adapted to maintain a reserve supply of water therein.

2. In an atmospheric pressure water supply system, the combination with a pump having its suction tube leading to a water supply, of a reservoir having a pipe connected to said suction tube below the pump and adapted to refil automatically when pumping has ceased and to maintain a reserve supply of water to the pump, and means for priming said reservoir.

3. In an atmospheric pressure water supply system, a pump having a suction tube leading to a suitable water supply, a reservoir arranged adjacent to said pump having a pipe connection from the bottom connected to the suction tube below said pump, a pipe leading from the top of said reservoir to the pump tube

(Continued on page 34.)



WANT PUBLIC LAVATORIES

Earlscourt local associations are again taking up the matter of public lavatory accommodation for the district. Nearly a year ago public protest brought the promise of such a convenience at the corner of Lansdowne and St. Clair Avenues, but it is still absent. It was the consensus of opinion at that time that Dufferin and St. Clair was a more suitable spot, and that opinion still holds. "It is about time that the attention of the civic authorities was brought to bear upon this subject," said a St. Clair business man. "The north-western section of the city is no longer of village dimensions. We now have the population of a town and require the conveniences of a town. It is a disgrace the lack of public conveniences here."

This is undoubtedly a move in the right direction, and it is to be hoped that success will attend the efforts of the above associations. It is a disgrace to see municipalities all over the Dominion spending millions of dollars in a variety of wasteful ways and leaving the question of public comforts to die a natural death and its citizens suffering untold pain and inconvenience. Who knows but what hundreds of diseases are caused because of the lack of public comforts?

The Health Department would not allow any person to build a hotel without properly equipping it with bathrooms, lavatories, etc. Why should the civic authorities allow a city to be built without such public comforts?—Editor.

A LETTER FROM ONE OF THE BOYS

Editor The Sanitary Engineer:

Knowing how interested you are in the doing of the Canadian boys, I thought you would like to have a line or two from me. We are told that all our letters are censored and any important happenings around here, on either land or sea, are not allowed to be described by letter.

As you will see by the address, we are still in England and as all news is kept very close, we do not hear anything definite as to when we shall leave for the front. Since landing here on the 14th of June we have realized that army life is no picnic but as we are in it for a good cause, we must take the rough with the smooth and keep a-smiling.

To bring a recruit up to the standard of the British Tommy means a lot of hard work, and I am glad to say that our unit is in splendid shape and will give a good account of itself when the right time comes.

Since we arrived in England our work has consisted chiefly of machine gun drill and firing practice, trench digging, route marching and guard tactics. There are lots of things I like better than having the beautiful English rain running out of one's boot tops when on guard duty. But without doubt all this is necessary to make hardened soldiers of us. When the Kaiser has received all that is coming his way I think things will be better all round this world and specially in Canada there will be splendid times again.

I received The Sanitary Engineer with an account of the picnic on the Island and was also pleased to read of the Buffalo Society of Sanitary Engineers paying you a visit as well as the account of the visit made to Port Hope by the Toronto society.

We often take a few miles of a run out before breakfast and if I return by chance before next picnic, T. B. Smythe will have to "run some" if he attempts to carry off any more prizes. He won't have a look in on the first prizes, rest assured.

You have no idea how proud we Canadian boys over here are, at the way Canada is doing in the way of raising both money and troops, and I sincerely hope her people will never "let up" until Kaiser Bill is "let down."

Kind regards to all the boys and yourself.

HARRY RUDDICK.

POSTAGE ON PARCELS GOING TO THE TROOPS IN FRANCE

The Department is in receipt of applications to have parcels addressed to our soldiers in France sent free or at reduced rates of postage, there evidently being an impression that the Department has control of these rates and could do as it wished; but this is not so, as the question of postage is fixed by international agreement, so that it is not within the power of the Canadian Post Office Department to undertake to carry the parcels free or at a reduced rate of postage. Under international law, provision is made for the free transmission of parcels for prisoners of war, but this privilege does not extend to parcels for troops engaged in active service, nor is it within the power of the Department to so extend it.

The rate of postage required on parcels addressed to the troops depends upon the location of the addressee. If the addressee is in England, the rate on parcels for England applies, which is

(Continued on page 31)

1. *Are we downhearted? I should say not.* 2. *We find these range lavatory basins as good as the best, all open plumbing and no permits required.* 3. *Brother Harry Ruddick on sentry guard.*

Interesting Notes on Ventilation

The Subject of Proper Ventilation of Buildings is One Which is Rightly Receiving Greater Attention from Sanitary and Heating Engineers—It is a Sanitary Matter and is Thus Quite Within the Scope of Their Work.

By R. O. Wynne-Roberts, Temple Building, Toronto.

AN interesting paper on "Researches on the Ventilating Shaft," by Dr. J. Newton Friend, principal of the Victoria Institute Science and Technical Schools, Worcester, England, appeared in the July issue of the Journal of the Royal Sanitary Institute.

Dr. Friend built up square wooden flues, boring a clear interval cross sectional area of 100 square inches. These were of various lengths and angles. In the side and near the top of such flues he had 3-inch circular holes cut for the purpose of inserting the anemometer, thermometer and other instruments.

Ordinarily, tests on the volume of air discharged are made by means of electric-driven fans, but in this case aeromotive power was used, by burning coal gas in a flat flame burner. The gas consumption was measured by means of a sensitive gas meter.

In general terms, the thermal energy employed in these experiments was absorbed in friction, radiation through the flue walls, sensible heat loss at outlet and kinetic energy. Friction is governed by the smoothness or roughness of the surface of the walls and is proportional to the perimeter of the flue and its length, assuming the surface condition is uniform. Since a circular flue contains the greatest area per unit of perimeter, its frictional resistance to a given flow of air would be less than that of a rectangular flue, but in building construction the latter are nevertheless mostly used. Prof. A. H. Barker submitted that the frictional loss of head in aeromotive units due to variations in the length, shape and cross section of the shaft were taken into account with some accuracy in the formula $P_1 - P_2 = P \frac{Z}{a^2} \frac{v^2}{g}$ where Z was length, c circumference, and a area, all in foot units, P the co-efficient, was investigated at Charlottenburg and London University, and was variable. Friction is also a function of gaseous density and gaseous viscosity, but these factors do not appear to be important. Losses by radiation can be controlled by selecting non-conducting materials and by careful insulation. Sensible heat losses can be reduced by increasing the height of the flue or reducing the consumption of gas, when heat would be wholly utilized in expanding the gases and inducing the maximum pull or draught under any particular condition. It was found that there was an optimum height of shaft for a specific consumption of gas, and an optimum gas flame to induce the maximum draught in a shaft of given dimensions. Thus in the experiments, a 12-ft. shaft discharged an increased volume of air when the consumption of gas was increased, but the maximum quantity of air per cubic foot of gas was when two-thirds of a cubic foot of gas was used per hour, after which the ratio of the volume of air per cubic foot of gas diminished.

Dr. Friend also found that with a velocity ranging from 8,000 to 18,000 feet per hour, which probably represent those in ordinary practice, each additional foot in vertical height of a flue above the first 16 feet and up to 21 feet increases the velocity by approximately 4 per cent.

The resistance of angles and bends was studied as far as the experimental equipment permitted. Angles of 30°, 45°, 60° and 90° were used and velocities of the air current up to 200 feet per minute were tried. The velocity of air passing through a straight vertical shaft when consuming a certain quantity of gas was ascertained, and this was again ascertained in a shaft of the same height, but with two or four angles inserted; the difference in velocity was evidently due to the retarding influence of the angles. The effect of each right angle bend on a 100 square inches shaft was to reduce the velocity to 79 per cent. of that passing through a straight shaft. Dr. Friend states that one right angle bend is about equivalent in frictional resistance and retardation to about five feet of straight pipe. If the bends were rounded off, the effect would, of course, be greatly reduced. Dr. Friend's empirical formula to ascertain the effect of angles is

$$\frac{\text{velocity in bent pipe}}{\text{velocity in straight pipe}} = \frac{4}{4+\text{Sin}^3\theta} = Q$$

θ represents the angle from vertical and Q the co-efficient of resistance. This formula is claimed to be correct to within 2 per cent. of the experimental results, as shown by the following table:

Angle	Mean Experimental Value of Q	Calculated Value of Q
90°	0.794	0.800
60°	0.876	0.858
45°	0.910	0.919
30°	0.976	0.970
0	1.000	1.000

In the discussion which followed the reading of Dr. Friend's paper, Sir W. N. Stow, the director of the British Meterological Office, stated that this "subject bristled with difficulties." "To estimate the effect of a succession of bends as a factorial reduction of the flow implied all sorts of assumptions as to the resistance arising from other causes." He stated that experimental data from co-ordinated measurements upon the flow of air were very scanty, and that Dr. Newton Friend's observations were a welcome addition to the stock.

The measurement of volume of air discharged by means of observed velocity requires the employment of delicate instruments. The use of an anemometer is apt to give inaccurate results because the flow is not uniform in a shaft. Prof. Barker having devised an extremely delicate micro-anemometer, was able to ascertain that there was a down draught in the centre of a flue and an up-draught on the sides. He also tried the electrical method—an adaptation of Thomas electric—of heating air by a measured quantity of electrical energy and observing the use in temperature. The pilot tube has been used for the purpose of measuring the velocity and volume of air, but the differential pressure is small unless means are adopted to magnify the same by using liquid of low specific gravity or tangential indicators. Prof. Barker contended that the kinetic energy of the gases leaving the chart could be ascertained by

$$\frac{p\ a\ v^3}{2}$$

in foot poundals per second and the total flow = v a p pounds per second, whilst that quoted by Dr. Newton Friend was $\frac{p\ v^3}{2a}$

p = density in lbs. per cubic foot.
a = area of shaft in square feet.
v = velocity in feet per second.

Ventilation is of great importance in Canada, as in winter time the ordinary means of ventilating rooms and buildings are interfered with by double windows, storm doors, etc., and at the same time the temperature is maintained at 65° to 75° F. Consequently, when the rooms are occupied by a number of people the air becomes impure and oppressive. How to satisfactorily ventilate our buildings is a problem which has not been solved in all cases, as is evident to those who have occasion to attend meetings in churches, theatres, lecture halls, city halls, etc.

A Chat About Metals

No Craftsman Should Take More Interest in Metals Than the Sanitary and Heating Engineer. This Article Deals With Metals and Their Behavior When Alloyed With Other Metals or Chemicals.

PROBABLY no practical sanitary and heating engineer can deny having had trouble with a copper soldering bit after the tin has been burned into through leaving the tinned bit too long on the fire-pot or in the fire. It is found to have turned hard and is not only difficult to re-tin, but unless the file is in good order and clean the surface can scarcely be penetrated, and unless this hard surface is entirely removed the tin will not stick. This is because the surface thus hardened has ceased to be copper, but is really bronze.

Copper was the first known metal, then came tin, which when alloyed with copper gave us bronze.

The native copper deposits of the Lake Superior regions were worked by prehistoric inhabitants. Then came tin, which as we stated before gave us an alloy called bronze from which the Bronze Age period derives its name. With the exception of iron, copper is the most important metal of our day.

When man first became acquainted with metals, only the softer ones were mined, viz.: copper, tin, gold and silver, and all were worked into various utensils and weapons, the first two especially being used for this purpose. Even as late as the Spanish Armanda bronze was used for cannon, some of which are still in existence.

In these early days only the native copper was used, but to-day by far the largest quantity is obtained from the sulphide ores, of which copper pyrites is the most important.

When pure it contains 34.6 per cent. copper, 30.57 per cent. iron and 34.9 per cent. sulphur, but the average ore carries only about 12 per cent. of copper. Spanish iron pyrites is another source of supply; it is first used in the manufacture of sulphuric acid, after which the copper is extracted from the "cinder." It contains only 3 or 4 per cent. of copper, but carries also a small proportion of gold and silver, which makes it a profitable ore.

All alloys must contain two or more metals, and to be of any use they should have some affinity with each other, that is they should easily mix with each other when brought to a melting point or fluid state.

The next metal of importance to the sanitary engineer is lead, because it is not only used considerably in its refined state, but is also one which will easily mix with other metals and alloys used in the trade.

The most important ore of lead is galena, lead sulphide. In the United States it is found in the upper valleys of the Mississipi, as well as in the Rockies. Trail lead mines of B.C., are noted in Canada as being a great source for our local supply. The mines of Spain, England, Germany, and the Isle of Man furnish the bulk of the European product.

When pure it contains 86.6 per cent. of lead. Galena usually contains silver, and frequently a small amount of gold. It is associated with sulphides of zinc, antimony, copper and iron.

When the use of galvanized iron first came into the practice of sanitary engineering serious misgivings were voiced by both those in favor of galvanized iron pipe and those against it. The former were often heard to declare that lead pipe would soon lose popularity because it had been proved that there were possibilities of lead poisoning on account of the water becoming contaminated with lead.

However, these very statements only went to prove that those persons making such assertions knew very little about it. The fact of the matter is, that very few waters used for domestic purposes are affected by lead, but what really does take place is this: Lead pipes used for conveying water are soon covered with a thin layer of carbonate and sulphate of lead, which is insoluble and acts as a splendid protective coating preventing any further chemical action taking place.

The next metal which, however, is very seldom used by sanitary engineers is bismuth. Bismuth is one of the most costly metals used in alloys and were its value better known it would no doubt be used more frequently. For instance, a solder made up for use in making block tin pipe joints should contain 2 to 4 per cent. of bismuth, or when very thin lead gas pipes are being joined or repaired, such a solder would prove almost indispensable. Those sanitary engineers who cater to dairymen, when repairing pure tin utensils, milk coolers, etc., would do well to make up their solder with about 6 parts lead, 4 parts bismuth and 50 parts tin, and however thin the part to be repaired, the solder would be found to run easily, and at a much lower temperature than tin itself. Some such alloy is used to make the joints of fire sprinkler heads.

The following may sound strange, but it is nevertheless true. By mixing together 8 ounces of bismuth with 5 ounces lead and 3 ounces of tin, and then forming a strip about the thickness of a spoon, it will be found that the strip will melt in boiling water, whereas none of the metals separately would melt at a much higher temperature. For instance, lead melts at 620 deg., tin melts at 446 deg., and bismuth at about 330 deg., while boiling water would only be about 212 deg. at sea level.

While the following facts have little or no bearing upon the trade, it may not be out of place to mention that a small quantity of manganese makes iron indifferent to magnetism while a small proportion of tungsten will increase the magnetic power. Ferro titanium, if placed in a ladle and the molten iron allowed to flow into the ladle from the cupola will cause the metal to become more fluid and will therefore run into the thinnest parts of the mould. We all know that copper is a good conductor of electricity, but if a very small quantity of arsenic be mixed with it, its conductivity is almost completely negatived.

PARCELS TO TROOPS IN FRANCE

(Continued from page 29)

twelve cents per pound: whilst, if he is in France, the parcels are subject to the rates applicable to parcels for France, which are as follows:

1 lb., 32 cents; 2 lbs., 40 cents; 3 lbs., 48 cents; 4 lbs., 64 cents; 5 lbs., 72 cents; 6 lbs., 80 cents; 7 lbs., 88 cents; 8 lbs., $1.02; 9 lbs., $1.10; 10 lbs., $1.18; 11 lbs., $1.26.

These are exactly the same charges which existed for years between Canada, England and France before the war, and are the result of an agreement or convention made between these countries and Canada, and as these countries have not agreed to lower their rates between England and France, Canada has to pay to them the same rates as before the war and must charge the same postage.

In all cases parcels for the troops must be addressed care of Army Post Office, London, England, but this does not in any way affect the rate of postage, which depends entirely upon the location of the addressee.

Post Office Department, Canada.

Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

HOW TO CONNECT RANGE BOILER TO THREE SOURCES OF HEATING

Editor The Sanitary Engineer:

I have not been a subscriber very long to The Sanitary Engineer, but find it very interesting and useful to me. I have been called upon to connect range water front situated in a basement laundry, the range in the kitchen above and a gas water heater, all to one range boiler, which also is situated in the kitchen. Could you please show one or two methods which would be satisfactory in the next issue of The Sanitary Engineer?

A New Subscriber.

We have shown below how the connections may be made in three ways. Fig. 1 shows a method which has been proved to give good service. It will be seen that both the water fronts are connected in such a way that circulation is established through them both. Such a connection will give the maximum of hot water

(Continued on page 34.)

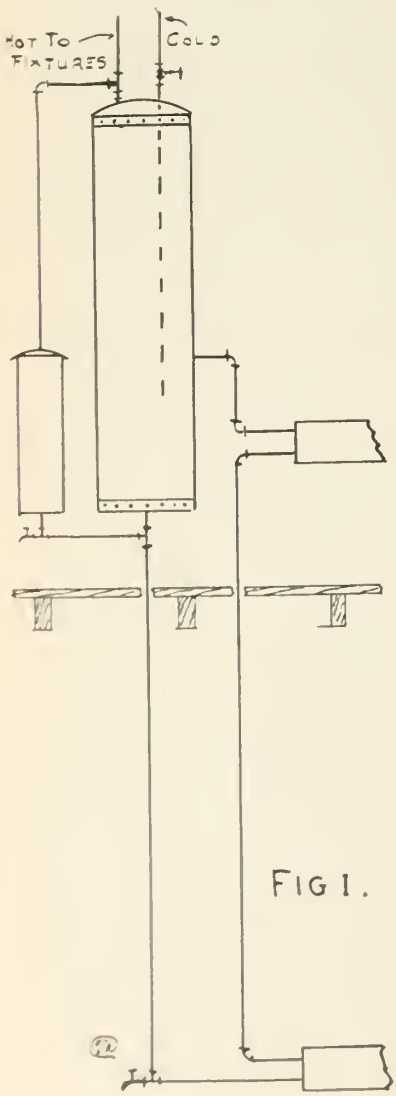


FIG I.

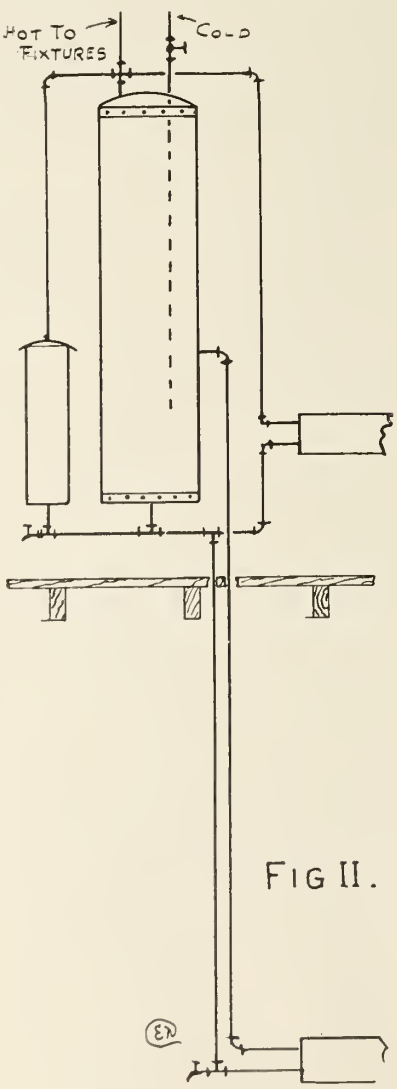


FIG II.

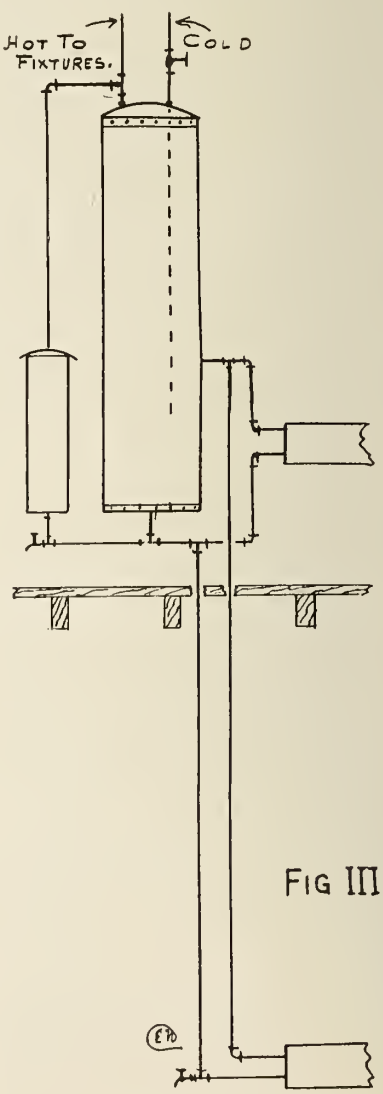
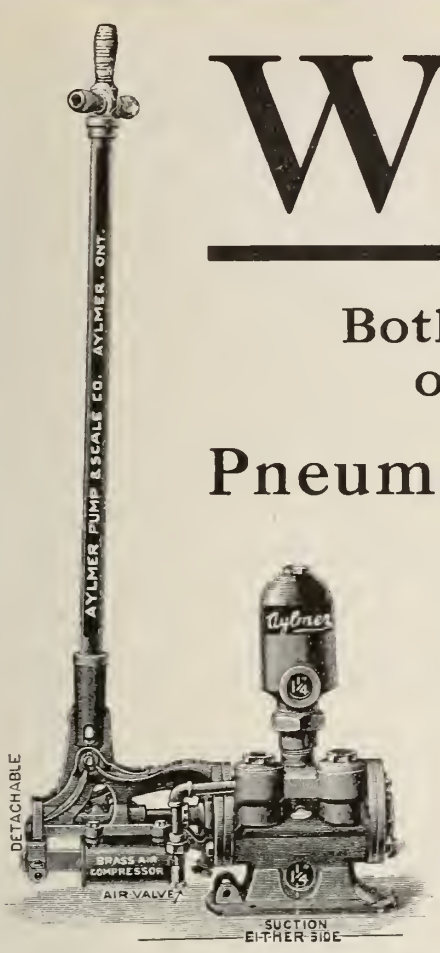


FIG III

WHICH?

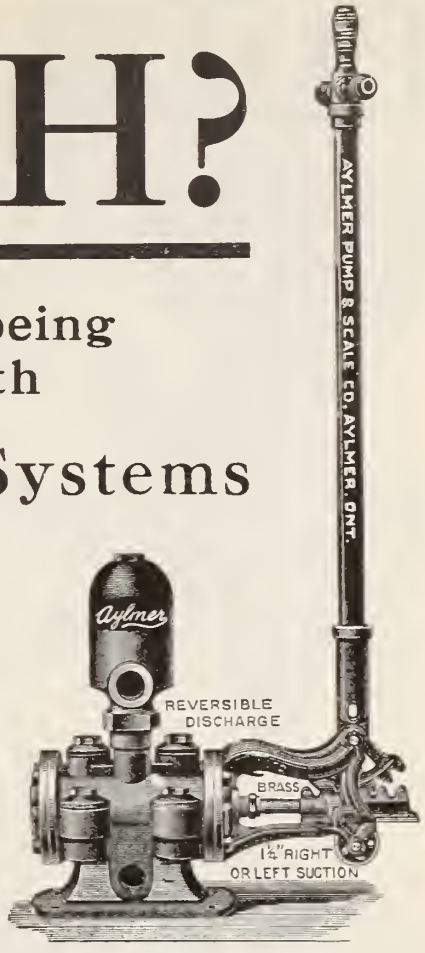
Both types are now being offered for use with

Pneumatic Water Systems



Type A

A positive means of pumping air is **absolutely necessary** under all conditions.



Type N

Type A.—Has separate air compressor, which supplies air to Tank, regardless of water level in cistern.

Type N.—Is usually equipped with small pet cock and check valve on suction side of pump (which of course cuts down capacity of pump). This method can only work when conditions are very favorable

Cisterns are frequently situated so that water gravitates to pump. (See illustration).

Under Such Conditions

Type A.—Pumps both air and water as desired.

Type N.—Does not. Can not. A vacuum must be created before air can be pumped.

Type A.—Pumps both air and water even when pump is on the suction limit.

Type N.—Does not. Can not. To open pet cock on pump under such conditions would be to destroy the vacuum and lose both air and water.

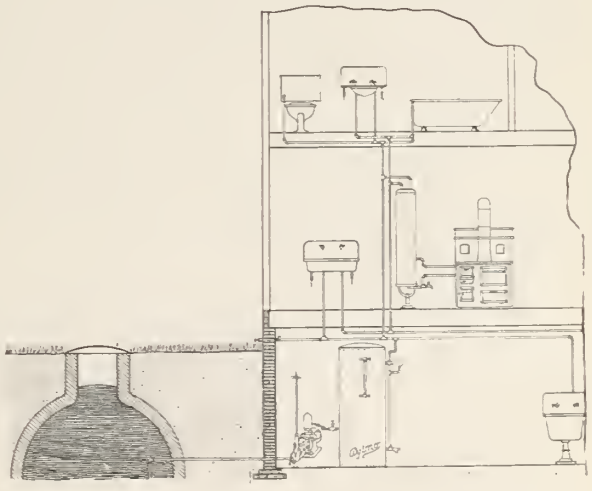
DON'T TAKE CHANCES, MR. DEALER.

Aylmer Systems include **Type A pumps,** successful under all conditions.

We are the only firm actually manufacturing this line of pumps in Canada.

Aylmer Systems cost you no more than ordinary jobs and mean no trouble.

Get our prices.



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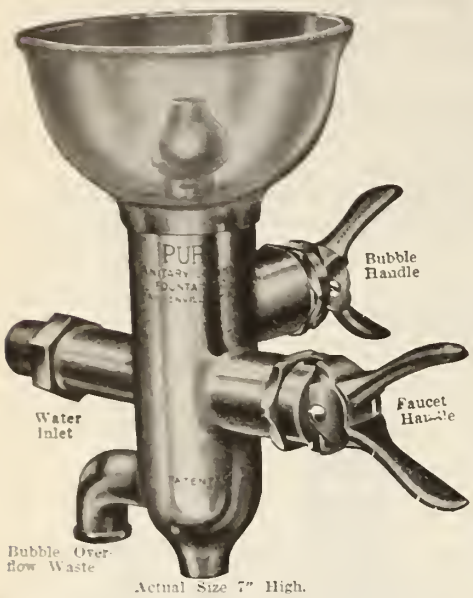

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Did you ever stop to think how many gallons of water are wasted by the old-fashioned drinking faucet?
Puro saves 35% of that wasted water.
Puro does away with the old-fashioned unsanitary tin cup, it is the Safety Sign of pure water in every factory where it has been installed.
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Easily attached—positively fool-proof—and nothing to wear out.
An excellent investment—for shop and office alike—and one that pays dividends in real money in water saving and better workers.
Write to-day—now—tell us how many men you have and the number of departments.
We will make you a complete estimate on an installation—we will also make you a special proposition for a try-out in any one department.

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KINDLY MENTION THIS PAPER WHEN ANSWERING ADVERTISEMENTS.

THE QUESTION BOX

(Continued from page 32.)

when the lower water front is in use. This is very desirable on account of the fact that when the basement range (it being situated in the laundry) is being used a larger quantity of hot water is required.

Fig. 2 is a connection very desirable when there is a heater in the furnace which is only likely to be used in winter time. The range in the kitchen is shown connected for quick heating as well as the gas water heater. Such an installation comes in handy when the range is only going to be used for an occasionally short period. When a little hot water is wanted quickly and the range is going, the gas water heater can be lighted and will at once respond with a fairly good supply.

Fig. 3 is somewhat different to either Figs. 1 or 2. It will be seen that each connection is made so that the whole three sources of heat will work independently, or all together. The water front or coil in furnace whichever it may be, is in direct connection with boiler, as is the water front on the kitchen range. There is no change in the gas water heater in any way. It will, however, be seen that a bibb tap is placed just below the gas water heater, as well as on the connection in the basement. The reason for this extra tap is that when there is only one on the basement connection it is seldom if ever used. If, however, there is one in the kitchen the household can be instructed to use it often, which will result in the boiler being kept clean, and the household will get into the habit of using these taps wherever they are situated.—Editor.

* * *

IS ALUMINIUM MINED OR WHAT?

Editor The Sanitary Engineer:

This question I am about to ask may be somewhat out of keeping with the work of the sanitary engineer, but I would like to know in a general way how aluminium is procured, is it mined or what?

No, aluminium is not mined as generally understood by the term mining.

Aluminium was discovered by Wohler in 1828, and is probably the most abundant of all metals known, because of the fact that it exists and is found in every variety of clay (silicate of alumina). It is more easily obtained from its ores, such as bauxite.

The ground mineral is mixed with soda-ash and heated in a reverberating furnace, when the soda combines with the silica and alumina, forming silicate of soda and aluminate of soda, the carbonic acid being expelled as gas. The mass, after cooling, is treated with water to dissolve the aluminate of soda, which is then mixed with hydrochloric acid to remove the soda leaving a gelatinous precipitate of hydrate of alumina. This is now mixed to a stiff paste with common salt and charcoal powder, made up into balls the size of one's fist, dried, and heated in earthenware cylinders through which chlorine gas is passed. The carbon of the charcoal combines with the oxygen of the alumina and escapes as carbonic oxide gas, while the aluminium unites with the chlorine to form chloride of aluminium; this combines with the salt (chloride of sodium) to form a double chloride of aluminium and sodium, which distils over and condenses to a solid mass.

It is then mixed with sodium and fluorspar to form a slag to protect the metal, and thrown upon the red-hot hearth of a reverberatory furnace, which is immediately closed to exclude the air. The sodium abstracts the chlorine and frees the aluminium which collects in a melted state below the slag. At first aluminium was looked upon as rather a precious metal, it being 15 to 20 times dearer than it is even to-day. Three or four years ago it could be bought as low as 16 cents per lb.—Editor.

NEW BULLETINS

The James Morrison Brass Mfg. Co., Toronto, have issued a bulletin illustrating and describing their line of safety valves for high and low pressures and super-heat steam. A price list is included for the various types.

NEW CANADIAN PATENTS

(Continued from page 28.)

above the pump cylinder, and valves arranged in the pipes leading to said reservoir adapted to control the direction of flow of water to or from the reservoir.

4. In an atmospheric pressure water supply system, a pump having a suction tube connected with an atmospheric pressure water supply, a reservoir arranged adjacent to said pump, a pipe leading from the bottom of said reservoir and connected to the suction tube of said pump below the cylinder, a pipe leading from the pump above the cylinder to the top of the reservoir, stop valves arranged in the pipe leading to the reservoir, means connecting said stop valves so that the upper valve will be closed while the lower one is open and vice versa.

Brass acquires a black scale by being in the fire, and this is best remedied by acid pickle made up of 1 part sulphuric acid and 9 parts water. Use this solution hot and in a short time the scale will be removed, leaving the brass red. It should then be bright-dipped, to give it a uniform bright color.

You can put a stop to faulty hot water systems by installing

The Knickerbocker Generator

It is a positive remedy that is easily applied to the open or closed systems of hot water heating.

Entirely automatic.

Connects with one-inch nipple to outlet of expansion tank.

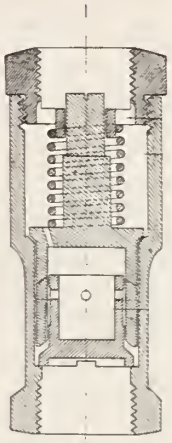
Makes a hot water system equivalent to a low pressure steam plant.

Increases radiation from 25 to 30% with same firing.

Reduces the size of pipes and fittings.

Temperature of water can be varied up to 250 degrees.

A top-notch profit producer.



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We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

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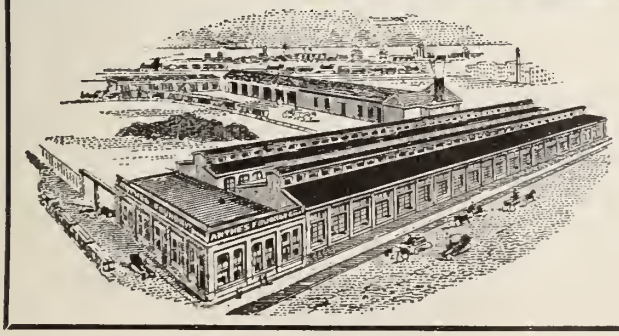

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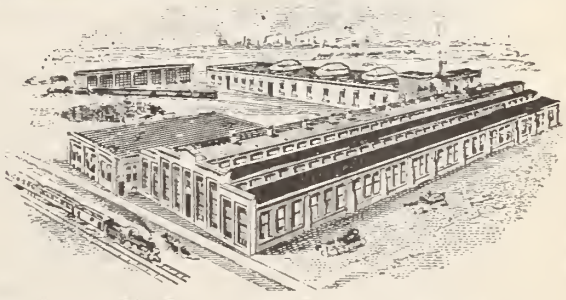

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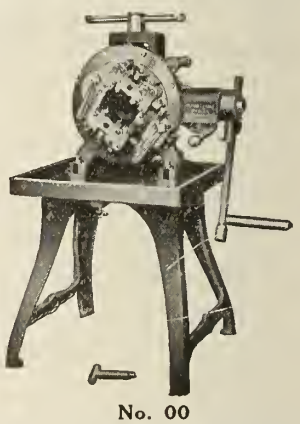

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All parts are interchangeable.
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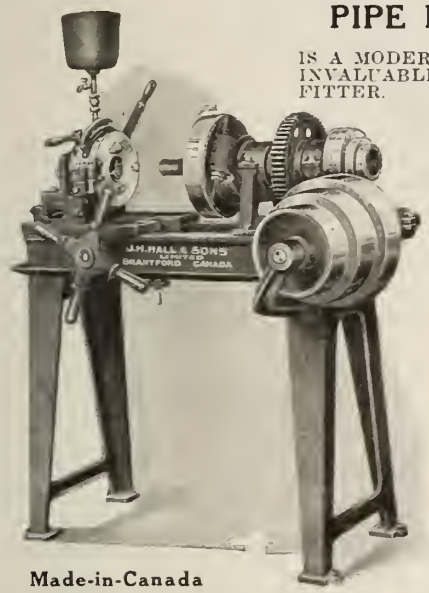

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Only one of the many sizes manufactured by us.

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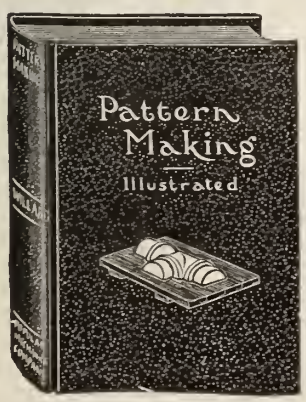

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Call attention to a new and valuable type of the Steamo Air Moistener, for attachment to steam risers. It is a very useful type and you should know about it.

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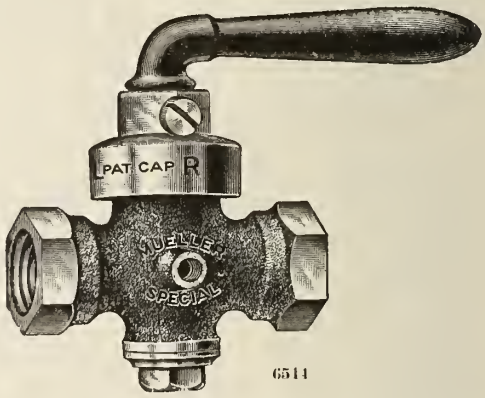

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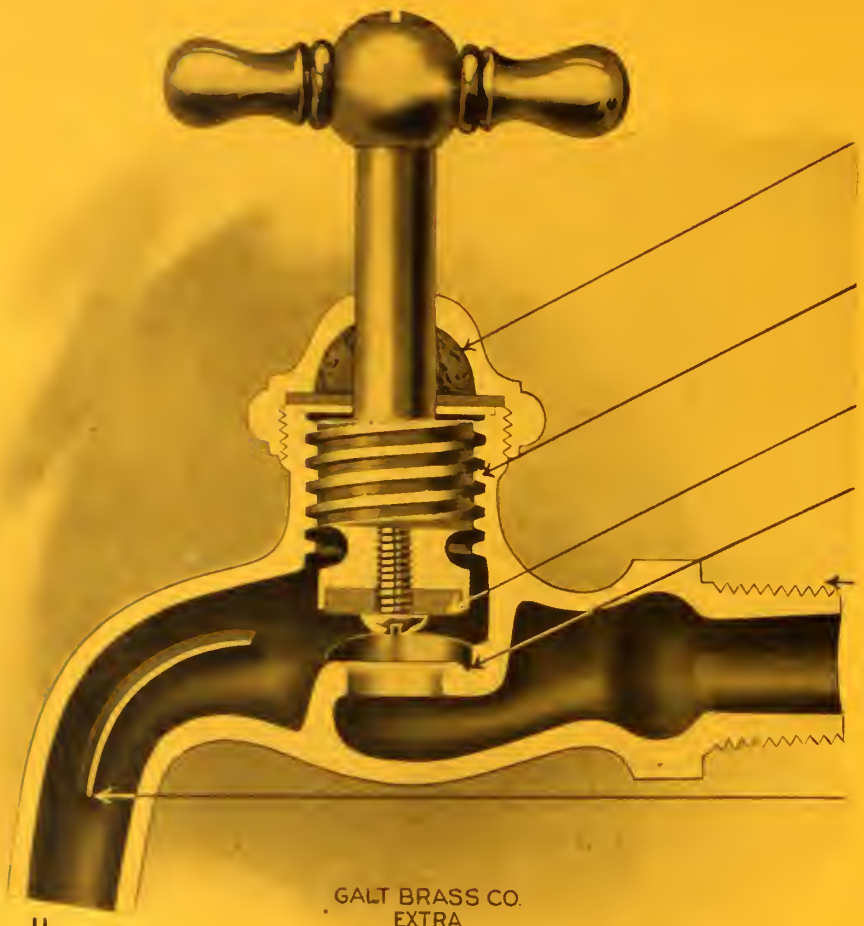

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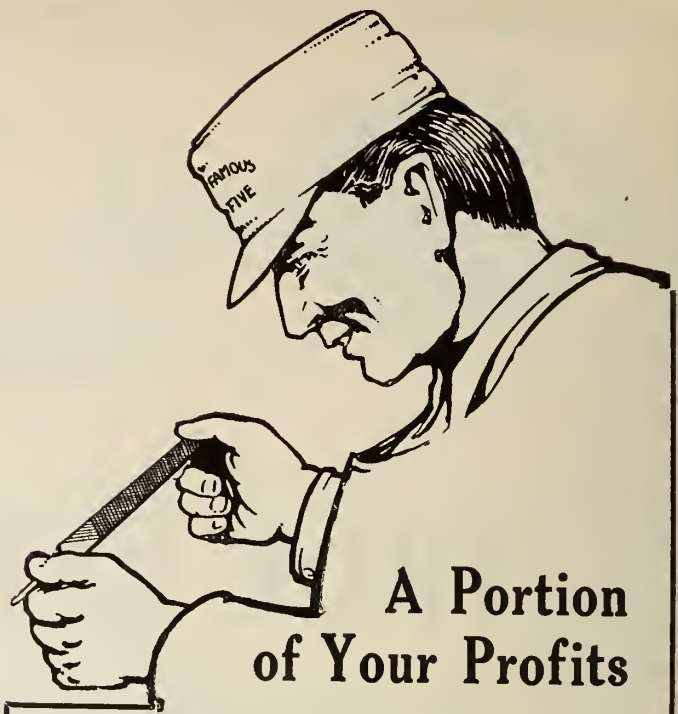

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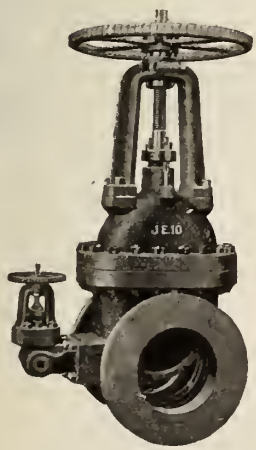

Fig. 204-B

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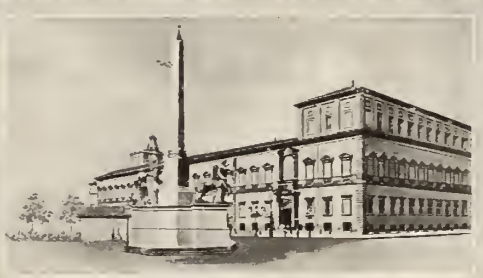

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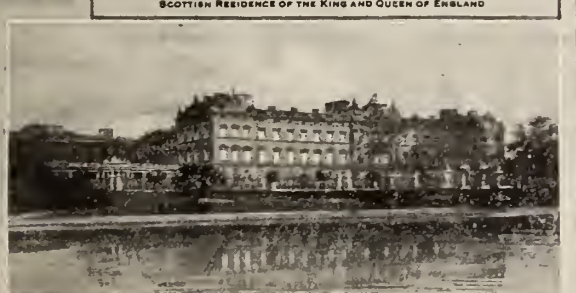

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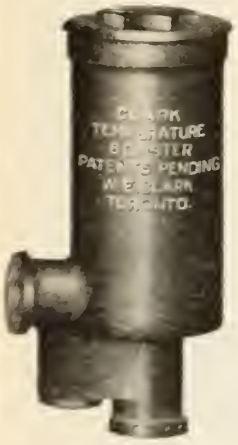

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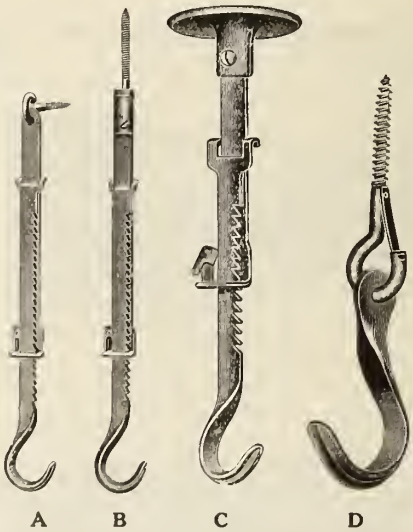

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PLUMBER and STEAMFITTER of CANADA
Official Organ of the Sanitary and Heating Trade

Vol. IX. TORONTO, DECEMBER 15, 1915 No. 24

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The Closing Year—Business Outlook—What is Economy?

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THE SANITARY ENGINEER

VOL. IX. DECEMBER 15, 1915 No. 25

Manufacture of Galvanized Sheets

Establishment of Factories For the Manufacture of Products, the Demand For Which Has Hitherto Been Supplied Entirely by Foreign Producers. The Demand For Sheet Metal in This Country Assures a Market Which is Distinctly Encouraging to the Organizers of This Enterprise

By A. G. Webster, Associate Editor, Canadian Machinery

A NEW industry for Canada was inaugurated on September 1 last when the Dominion Sheet Metal Co. started operations at their new galvanized sheet plant at Hamilton, Ont. The plant occupies a site covering five acres, and is situated on the belt line railway, jointly operated by the G. T. R., C. P. R. and the T. H. & B. It is within a short distance of Lake Ontario, the water of which being soft and clean, is particularly suitable for the process of galvanizing. If hard water only were obtainable, the effects of lime and other deposits, which prevent the sheets from receiving the coating properly would have to be neutralized.

In normal times approximately 70,000 tons of galvanized sheets are used in Canada per year, and prior to the establishment of this plant no sheets were produced in Canada, the bulk of the supply being imported from the United States and some from England. The product of this plant bears the trade mark of "Premier," but in addition the company makes a "tight-coated" "Premier" galvanized sheet when desired. This latter is especially useful for purposes requiring extreme forming, seaming, etc. The black sheets from which the "Premier" galvanized sheets are made are specified from certain mills, and must conform to exact physical and chemical analysis. All the materials used, such as open-hearth or Bessemer black sheets, spelter, lead, tin, sal-ammoniac and acids, etc., must conform to approved chemical analysis, subject to test.

Plant Layout

The factory comprises two bays, east and west, the former being 50 ft. x 200 ft., and the latter 60 ft. x 200 ft. A spur from the belt line railway runs into the east bay for its entire length; the loading and unloading of the cars is, therefore, done under cover. By this arrangement the handling of the sheets, both black and galvanized, is greatly facilitated. In this bay is installed a 124-in. squaring shear for trimming sheets, which was built by the Bertsch

A. T. ENLOW,
PRESIDENT AND GENERAL MANAGER.

Co., Cambridge City, Ind. Provision has also been made for installing any additional machines that may be required in the future.

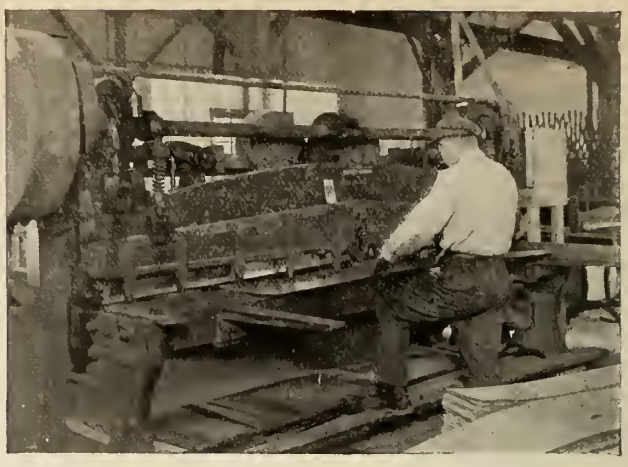
In the west bay the entire space, with the exception of a galvanized sheet store room at the north end, is occupied by the galvanizing plant. At the south end of this bay is the black sheet storage; further along are the picking machines, washing tanks, storage tanks and galvanizing machines, while extending into the east bay are the cooling machines. The west bay has a monitor roof for providing sufficient ventilation. In handling the sheets, a five-ton electric crane is installed. The crane operates over the entire length of the west bay, and was built by the Northern Crane Works, Walkerville, Ont. When the black sheets arrive on the cars they are placed on hand trucks and weighed, and then moved into the west bay, where they are picked up by the electric crane and transferred to the store room. Here they are placed in piles, according to gauge. When undergoing treatment they are placed side up in crates, to which are attached crane hooks. An interesting feature about these crates is that they are made of "Monel" metal, each crate representing an outlay of $1,000. "Monel" metal possesses the characteristics of being able to withstand the corrosive action of the hot acid in the pickling tank and lasts indefinitely, whereas crates made of bronze would soon corrode. This metal is a by-product, and is obtained from Sudbury, Ont.

Pickling Process

The first process consists of pickling, where the sheets are treated with sulphuric acid to remove the scale and clean the surface, so that when being galvanized the spelter will adhere perfectly to the sheet. The pickling machine consists of two plunger tanks of the latest type, each tank being 12 ft. 6 in. x 3 ft. x 5 ft. deep, and having a capacity of from 100 to 300 sheets, according to gauge, at one operation. The tanks are constructed of solid 8 x 10 in. Georgia pine, and have a bottom of lead. At one side of each tank is a plunger, also made of Georgia pine. The plungers are mechanically operated, and are used to agitate the liquid in the tanks, by which means the sheets are kept separated so that the acid may work more effectually.

There are three pipe connections for each tank for water, sulphuric acid and steam, respectively, the latter accelerating the pickling process. Adjoining the pickling machine are two independent sulphuric acid storage tanks, one for

Store room for black sheets.



Squaring sheets on shearing machine.

each pickling tank, equipped with floats and gauges for regulating the quantity of acid used. The acid flows by gravity to the pickling tanks. The independent acid tanks are connected to a large acid storage tank located outside the building, and having a capacity of 60,000 pounds. The acid is obtained from the Grasselli Chemical Co., which adjoins this plant. The steam for the pickling flush is obtained from a boiler, which will be referred to later in detail. The sheets remain in the pickling liquid for about thirty minutes, after which they are removed to the rinsing tanks.

The machinery for operating the plungers is located in a pit under the shop floor and adjacent to the tanks. The electric motor which drives the machinery is above the floor level, and is controlled by a "Wagner" polyphase motor starter. The motor is 10 h.p., 3-phase, 60-cycle, 220 volts, and was supplied by the Wagner Electric Mfg. Co., through their Toronto office.

A belt drive connects the motor to a pulley on the machine underneath, the power being transmitted to a crank shaft by a link-belt chain. A disc crank at the end of the shaft is connected by means of a connecting rod to another crank, which lifts a vertical rod up and down, thus operating the plungers. The motor starter and acid feed controller are located near together, both being within reach of the operator.

Washing Process

After the sheets have been in the pickling tanks the prescribed length of time, the crate holding them is lifted out by the crane which carries them over to the rinsing tanks near-by. These are two tanks constructed of wood, each being 3 ft. x 12 ft. 6 in. x 5 ft. deep. They contain clean, fresh water, which flows through in a continuous stream, thus effectively washing the sheets and removing all traces of acid. The sheets remain in the rinsing tanks for about thirty minutes.

If the sheets are not to be galvanized immediately, they are carried by the electric crane to storage tanks containing water, where they remain until required for further treatment. If required at the galvanizing machine, they are carried to the feed tank direct by the crane, after having first being inspected and placed in skips laid flat. In either case they are carefully inspected before any further treatment.

There are five storage tanks, each being 4 ft. 6 in. x 12 ft. 6 in. x 3 ft. deep. They are also made of wood and contain clean water. After inspection, the sheets are laid flat in a skip, which has a capacity of about 5 tons and placed in the tank.

Galvanizing Process

Great care and expert knowledge is required in this operation, which consists of coating the sheets with a thin layer of zinc spelter. It will shortly be possible to obtain Canadian smelted zinc. There are two galvanizing plants installed which are operated independently of each other. Each plant consists of a "pot" constructed of brick, and having a natural gas-fired furnace underneath. The "pot" contains the spelter, one charge weighing about 80,000 pounds, and also the machine for doing the galvanizing. The pot and furnace were constructed by the company, and the machine was supplied by the Berger Mfg. Co., Canton, Ohio. An interesting feature is the C. G. E. motor controller, which has 14 speeds ahead and reverse; by this means the speed of the sheet passing through the tank can be varied, as each different gauge of metal must be coated at a speed definitely determined in advance. The motor and drive for each machine are located in a pit near the machine, and thus do not obstruct the operators. The motors are each 7½ h.p., and were supplied by the Wagner Electric Mfg. Co.

Before being galvanized, the sheets are inspected and dipped in a tank containing muriatic acid; this acid cleans the sheets, and also acts as a flux or binding medium for the spelter. The sheets are fed from the tank through a

Pickling department where sheets are prepared for galvanizing.

pair of 6-in. rubber rolls through a bath of salammoniac, which is a flux and floats at one end of the pot only, on top of the spelter. The sheets travel down on guides immersed in spelter through the bottom rolls which carry the sheets along. The sheets then pass through another set of finishing rolls, which assist in the process, and also draw the sheets out of the pot. The speeds of the various sets of rollers vary, a feature which is carefully worked out in the construction of the drive gear. The temperature of the spelter in the pot is recorded on a pyrometer supplied by the Brown Electric Pyrometer Co., Philadelphia, Pa.

Cooling the Sheets

As the sheets leave the finishing rolls on a chain conveyor, they are carried between a series of rolls or levellers, which, as the name indicates, flattens out the sheets while hot. The sheets are then carried a short distance on another set of rollers to a table in front of the revolving cooling racks. On this table is a trip gear automatically operated, which places each sheet in position on each rack as the latter comes round. The cooling machine revolves very slowly, and, while doing so, compressed air is played on the sheets, giving to the smooth silvery surface that spangled appearance which distinguishes all galvanized sheets. The accompanying illustration will give the reader an idea as to the type of machine used for the cooling process. There are two of these automatic cooling machines installed, both having been built by the United Engineering and Foundry Co., Pittsburg, Pa. The cooling machines are operated by the motors that drive the galvanizing machines.

By the time the sheets have travelled over to the other side of the cooler they are cool. They are then taken from the racks, placed on trucks and carefully inspected on both sides for any imperfection. Any sheets that are imperfect are placed on one side, while the perfect sheets are branded. The sheets are now finished and are loaded into cars, which are inside the shop, or are bundled, weighed, and taken to the warehouse to await shipment when required.

Galvanizing machine with feed tank.

Heating and Lighting Feature

The boiler for heating the plant is located in the warehouse. The boiler is rated at 30 h.p., is of the horizontal return tubular type, and was built by E. Leonard & Sons, London, Ont. is fired from waste heat from the galvanizing pot furnaces, but is also equipped with gas burners as a stand-by. This boiler also furnishes the steam for the pickling tanks.

Current from the Hydro-Electric system is used throughout the plant for the motors and the lighting system. In connection with the latter there are a number of 600-watt tungsten lamps installed which give an exceptionally bright appearance to the interior of the shops. The offices are located in a separate building. On the property is a pond used for receiving the discharge from the acid tanks, a considerable saving in operating expenses being made by means of this.

Although the plant has only been in operation for a comparatively short period, the company has been very successful in producing a high-class sheet. The president and general manager of the company, A. T. Enlow, has had a lifelong experience in the sheet metal business, and is ably supported by an efficient technical staff. The company has thus been spared many of the troubles which would doubtless handicap a concern embarking on a new venture of this description under less favorable conditions.

Inspection department and automatic cooling machines for finished sheets.

HIGH-GRADE GOODS MORE PROFITABLE TO BUYER AND SELLER

It is generally admitted that there is very little profit in competitive work. Recommending high-grade products often puts the work on a service basis. Competition work does not thrive in the mind of the house builder, who wants something good and knows what he wants.

ESTABLISH CONFIDENCE

The ideal business connection is the one that benefits both the buyer and the seller. You are in business to make money, and should realize that the best way to do this is to sell the kind of plumbing fixtures that will establish you in the confidence of your customers.

Cooking With Gas on a Mammoth Scale

10,000 Soldiers, Whose Meals Are Cooked With Gas, Quartered in Toronto

THE military authorities having in mind, as always, the comfort of the soldiers under their jurisdiction, have equipped the various kitchens at the Exhibition Park and the old General Hospital with "Up-to-date" gas ranges.

This step was not taken until after exhaustive tests had been completed, and the various merits and demerits of coal and gas as fuel for cooking had been thoroughly investigated. Gas won out, much to the delight of the sergeant cooks and their assistants, who have to look after the all-important problem of preparing and cooking the soldiers' meals.

What this means to those who are so engaged, only those who have tried cooking on the coal range, and also cooking with gas, can imagine. No muss, no dirt, no waiting for the stubborn fire to burn up, kitchens not over-heated, no ashes to sift, no dirt flying around, just a clean, wholesome kitchen, with heat quite under control, and all this without waste of time and without loss of temper.

The food is properly cooked, not cooked only on one side, but cooked through, with all the nutritious juices retained.

Many of us know what a comfort the gas range is in our own home, but it is hard to realize the immense benefits derived from its use where the troops are concerned. Needless to say, they appreciate the use of gas in the preparing of their meals.

Of course it was necessary to study the matter of cost. Economy plays quite a large part in military circles, just the same as it does in any other organized public service or private business.

In order to prove that the original tests were quite correct, the gas meters have been read daily since the various units took up their winter quarters.

These readings show the gas consumed is costing the military authorities less than one-half of one cent per day per man.

Just try to realize what this means. Three good wholesome meals cooked for a healthy man, who has obtained a good appetite through strenuous exercise in the open air, for the modicum of less than one-half of one cent, and cooked with the smallest amount of trouble, and the least amount of labor, added to which there is the elimination of all dirt. This surely is efficiency with economy.

Now a word regarding the equipment chosen for this mammoth task.

In order that each unit should be placed on an equal footing, it was absolutely necessary that the authorities should standardize on the cooking equipment. After comparing costs and efficiency, a gas range was selected, comprising two ovens with four Star top burners over each oven, making eight top burners in all.

It was estimated that eight of these double ranges would be sufficient to cook for a battalion, consisting of approximately 1,200 men.

This estimate has proven to be correct, and this number of ranges is allotted to each battalion, the smaller units being equipped in proportion to their establishment.

Altogether, at the time of going to press, there are 81 double gas ranges in use at the two camps, and these will be added to from time to time, as other units are organized and quartered.

Gas is also being used to heat the water, both for kitchen purposes and for tub and shower baths.

A large instantaneous automatic gas water heater is installed in the Railway Building, supplying sufficient hot water for six showers just as required.

The hospital, situated in the Women's Building, is also equipped with an automatic gas water heater, supplying four tub baths. For kitchen purposes, the tanks are connected with gas water heaters, similar to the kind used in the majority of Toronto homes.

In order to supply the various buildings with gas (almost every building is in use, including the stables and sheep pens), it was necessary to lay a new main at the east end of the Fair Grounds, nearly 1,500 feet in length, in itself no small undertaking, besides augmenting several of the services.

So gas will play a very important part in camp life this winter in Toronto, the same as it does in most homes in the city, and the tendency will be to make the kitchen mess-room more homelike, the cooking better and more nourishing, besides lessening the labor of all those interested.

Who said that gas appliances and the use of gas was getting out of date, and a commodity belonging to the days gone by? Don't all speak at once.

A MARVELLOUS NEW METAL

Such tremendous developments have followed in scores of instances from scientific discoveries that seemed at first mere curiosities of the laboratory—witness radium, aluminum, the Röntgen rays, etc.—that we must needs listen respectfully and expectantly to the report that there has been found in Asiatic Russia a wonderful new metal "more mysterious than radium."

According to La Revue (Paris), the discovery was made by an explorer in Namangan, which is a part of the territory of Ferghana. The savant in question chanced accidentally to place his hand on a pasty mass lying among mica and other minerals. This substance, which was absolutely unknown to him, was opaque in color and of noticeable heaviness. His curiosity being aroused he carried a considerable quantity of it to a chemical laboratory in Moscow, where he subjected it to a minute analysis and experimented upon it with various reagents, with truly astonishing results.

In the presence of an acid, this metal, which as yet is nameless, generated such an excessive degree of cold that the glass vessel which contained the acid was immediately reduced to powder. Then an iron vessel was employed with the same result. The chemists continued the experiment with a large piece of granite. This was decomposed suddenly without either an explosion or an emanation of gas, but with a stupefying lowering of the temperature.

Treated with an alkaline reagent, the substance, which stubbornly resisted every analytical process, lost 20 per cent. of its weight.

These astonishing results so engaged the curiosity of the scientific experimenters that they journeyed to Ferghana, and after patient research succeeded in gathering a large quantity of this puzzling mineral, so as to be able to continue and extend their observations.—Valve World.

PERSONALITY THAT IS WORTH WHILE

The memory of an attractive personality is something that doesn't soon fade away—and an attractive personality is also something that can be acquired—it should be cultivated as a business proposition by the store manager and by every member of the sales force.

Personality is a force that continues to attract or repel long after the first meeting, and, other things being equal, customers return to the store where the man with the pleasant smile and winning manner is waiting to serve them.

CLEAN HIS OWN BOOTS

A story is told of Abraham Lincoln, which shows how he set a great example of economy and which also gives evidence of his ready wit.

Early one morning a certain member of Congress, paid a visit to President Lincoln's room, and found him busy cleaning his boots.

The member exclaimed: "My word, President Lincoln, I never thought you'd have to clean your own boots now you're the President."

"Oh," replied Lincoln, "Whose boots do you clean now you're a Congressman?"

Practical Sanitary Science

Being a Course in Practical Sanitary Science From the Very Beginning, a Course Which Every Reader of The Sanitary Engineer Should Study, Thus Enabling Him to Become More Than a Mere Threader of Pipe and a Joint Wiper.

Written Specially for The Sanitary Engineer by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

Article 18

The Sanitary Analysis of Water

IN previous articles the relative possibilities of the different sources of water supply being polluted were discussed and the value of a sanitary inspection was emphasized. The pollution is nearly always typhoid bacteria from sewage or excreta, which bacteria, still alive, have managed to reach the source of supply. The objects of a complete sanitary analysis is to show whether any particular water now contains, has contained, or is likely to contain typhoid infection or anything else that is detrimental to public health. Besides being free from any taint of pollution, it is desirable that water should not be objectionable to taste, odor or appearance, and should be suitable for laundry and general domestic use.

For a complete examination and report on a water supply all the following methods may be employed:

1. A sanitary inspection.
2. A physical examination.
3. A microscopical examination.
4. A bacteriological examination.
5. A chemical examination.

The importance of the sanitary inspection must be kept in mind; without it the results of the other tests may be misleading or valueless. For example, the normal chemical and bacterial content of surface water differs from well water. The results of a bacterial analysis, satisfactory for a surface water, might condemn a deep well water; the opposite might be true of a chemical analysis. It is important, therefore, to know the source of the sample and its surroundings. The fact is that so many factors enter into the problem of water analysis that everything bearing on the subject is of importance to get the correct interpretation of results. On the subject of water analysis, Dr. Paul Gerhard, writing in the year 1909 states, in one of his useful works relating to sanitation, as follows:

"Where only a single source of supply is available it is necessary to carefully determine the quality of the water, because this may require special means for its purification, and in case it is a very hard water, special methods and appliances for softening the water. All water containing even a small amount or organic matter of animal origin must be considered 'suspicious.' and a large amount of organic substances should lead to its being condemned as 'dangerous.'

"When several sources of supply are available, the selection is sometimes made by obtaining a comparison of the physical and sanitary qualities of the water sources. It is necessary, in all investigations of this character, to examine not only the physical character of the water, such as taste, color, odor, temperature, turbidity and hardness, but also to subject a sample, preferably several samples, of the water both to chemical and bacteriological analyses in order to test its suitability from a sanitary point of view. Modern knowledge on the subject of water supply requires that the result of the different analyses should be taken together, and much more stress than formerly is laid upon the number any kind of living organisms, or bacteria, found in the drinking water."

Don and Chisholm, writing in 1911 in their work on "Modern Methods of Water Purification," make the following statement in regard to the testing of water:

"The examination of water for its living content has now come to be regarded as a matter of the first importance, for it is bacterial pollution which most quickly reacts on the health of the consumers and conveys to them the seeds of the disease. Chemical analysis furnishes valuable information regarding the potability of the water, but the chief concern is to know whether the supply is or is not free from epidemic germs. The latter may find access to water accompanied by so little organic matter as would not arouse the suspicion of the chemist."

It may be safely stated, then, that the bacteriological examination of water is the most important from a sanitary standpoint, although other tests, particularly the chemical analysis, are of value. In the city of Ottawa, more than once visited by severe typhoid epidemics, the water supply is derived from the Ottawa river. The water is not filtered but is chlorinated, which treatment will be discussed in a later article. A number of public and private wells have been sunk in the endeavor to obtain a pure drinking water. The city bacteriologist and his staff are continually examining samples of water from the river and wells to make sure that the supply is not now infected. The point to be noted in this connection is that the tests made are practically all bacteriological.

It is the intention in this and succeeding articles to set before the readers of this paper a few of the facts in connection with the examination and analysis of water supplies with the hope that they may prove of interest and value.

The sources from which water supplies are obtained may be classed as follows:

1. Rain water.
2. Surface water in streams, rivers, ponds, lakes and artificial reservoirs.
3. Ground water from surface and deep-seated springs, shallow wells, deep and artesian wells and in filtration galleries.

In this country rain water is very seldom used for purposes of drinking or cooking food. It is collected, however, from the roofs of houses to be used for laundry purposes, being, as will be explained later, well suited for such purposes. As a matter of interest, it might be noted that on some islands of coral rock formation, the rain percolates into the rock so quickly that it cannot be collected in wells. People on these islands have to depend on the rain water for all purposes. Provision is made for collection areas of concrete that are kept as clean as possible.

From a sanitary point of view, ground waters are generally of a better quality than surface waters but are not so suitable for laundry purposes.

Physical Examination of Water

People instinctively prefer a cool, clear, sparkling water that has no unpleasant taste or odor. That is to say, the naturally judge the quality of a water by its taste and appearance. Our senses are the guide in this matter and a dirty-looking water or one with an unpleasant smell is looked on with suspicion. If there were no chance of sewage pollution, or that is to say, if we were under more natural conditions instead of the artificial conditions imposed by our civilization, such a discrimination between waters would no doubt be quite justifiable. It would mean that a water that appealed to our senses as pure would have been filtered through the soil and rocks and would be almost certainly free from pollution. Ground

waters that have been purified by filtering through the soil and rocks contain in solution the gases, oxygen (O) and carbon dioxide (CO_2). Without the first, water tastes "flat," like unaerated boiled water, and carbon dioxide is the same gas that makes "soda water" effervesce; it is these two gases in solution that make water pleasant to the taste. It is also true that water contaminated by sewage will contain carbon dioxide giving the same pleasant taste and sparkling appearance, but while clear to the eye may contain typhoid or other infection. On the other hand, unpleasant odors, taste or appearance may be caused merely by vegetable growths that are not necessarily insanitary.

Temperature

With other conditions the same, cold water is much to be preferred, not only because it is more agreeable to drink, but because in the summer it may mean a considerable saving in the ice bill. In the summer if the temperature of the drinking water is 45 degrees Fahrenheit, everyone is pleased. A number of people will probably object to water at 66 degrees and at 75 degrees everyone would object.

Surface waters are frequently too cold in winter and too warm in summer. More uniform in temperature are the ground water supplies; a well 50 feet deep will have a fairly uniform temperature of about 50 degrees Fahrenheit the year round.

If the source of supply is a deep lake fairly uniform temperature of from 40 degrees to 50 degrees Fahrenheit could be obtained by taking the supply at a depth of from 25 to 50 feet below the surface. This fact is illustrated in Fig. 43. The temperatures of different deep lakes vary but they probably approximate fairly well to those shown in the diagram. When a lake is frozen over the water under the ice always stands at 32 degrees Fahrenheit, and reaches at a certain depth below the surface a temperature of 39.2 degrees, which is the temperature at which water is most dense. In Fig. 43 this point is reached at a depth of 50 feet though it is nearly as great at a depth of 30 feet.

In the summer the rise in temperature at depths less than 20 feet is very rapid. In Fig. 43, the temperature at 20 feet below the surface is shown as 50 degrees Fahrenheit, and at 15 feet or only 5 feet higher as 70 degrees, a change of 20 degrees. Wind and storms as well as a change of atmospheric temperature will have an influence on the surface temperature of the water but it will have little effect below 20 feet. It can be seen that by taking lake water from a sufficient depth there would be but little variation in temperature throughout the year.

The temperature of the water at the surface of a lake can be read by immersing the bulb of a thermometer just beneath the surface. To observe temperatures below the surface there has been devised an instrument termed a thermophone which might be described as an electrical thermometer which can register temperatures to one-fifth of a degree. Ordinarily for depths not exceeding 50 feet a weighted thermometer may be placed in an empty bottle with a stopper that can be drawn out when the bottle is at the required depth. If the bottle is left in the water long enough to acquire the correct temperature and brought quickly to the surface and the thermometer quickly read the result is sufficiently accurate for ordinary purposes.

Color

Color in water may be partly caused by fine particles of clay, silt or organic matter in suspension. These can be removed by filtering, leaving only the "true color" due to dissolved substances which pass through the filter and which are derived from leaves, peaty matter and other organic matter over which the water has passed or come in contact. Ground waters are practically free from color but surface waters from swamps or peat bogs may have a color as dark as tea. This color is generally dependent on the amount of iron present. In such cases the water is not, however, necessarily harmful from a sanitary standpoint.

When cloth that has been dyed is exposed to the sunlight it is generally found that the color fades and sometimes very rapidly. Sunlight has the same bleaching action on color in water and under favorable conditions experiments have shown that all the color can in time be thus removed from water. It has been found that the surface water of reservoirs exposed to sunlight will lose half its color in about a month's time.

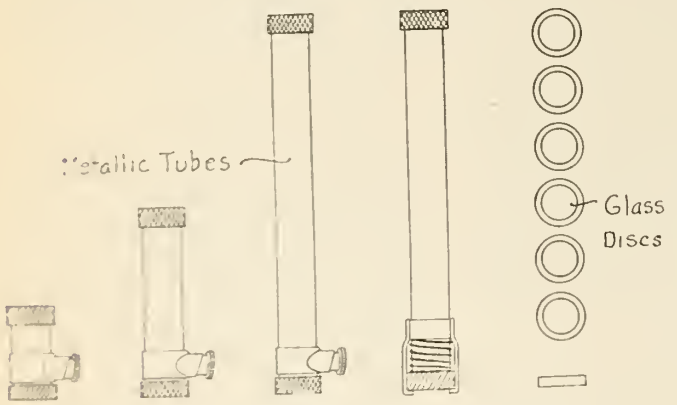


Fig. 44.
Apparatus for measuring the color of water.

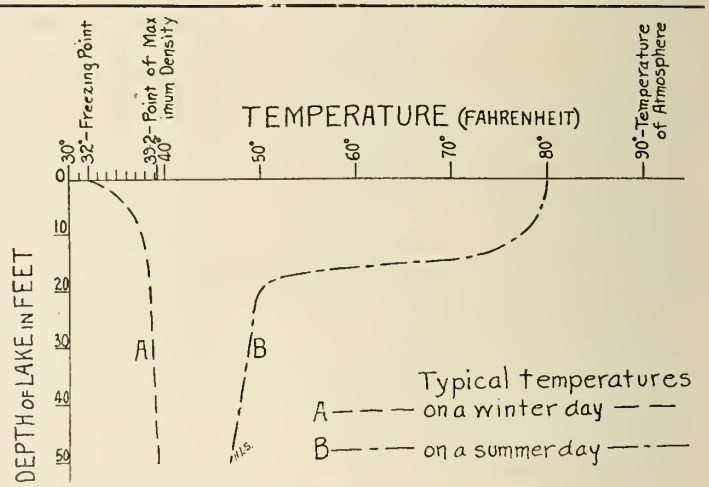


Fig. 43.
Diagram to show how the temperature of the water in a lake may vary according to depth in winter and in summer.

The easiest method of comparing colors of different samples of water is by the use of standard tinted glass disks. These may be viewed in daylight alongside the water under examination and a disk selected to match the tint of the water. This disk represents a standard of a certain amount, say 50. An examination of another water at a latter date might give a color of 60 and thus a comparison can be made without the necessity of having the two samples before the analyst at the same time.

Fig. 44 shows one method for determining color. The apparatus was devised for the U.S. Geological Survey. The illustration is taken from Whipple's book on the "Microscopy of Drinking Water," and he thus describes the apparatus:

"The water is placed in a metallic tube with glass ends and its color compared with a second tube containing distilled water and with one end covered with one or more of the glass disks."

(Continued in next issue.)

Pneumatic Water Storage and Supply

Pointing Out the Governing Principles of the Pneumatic Water System—A System Not Equipped With Provisions For Furnishing Air to Replace Loss by Absorption Should be Considered—More Attention Should be Given to This Subject by Those Installing Pneumatic Water Systems

By R. O Wynne-Roberts, Consulting Engineer, Temple Building, Toronto

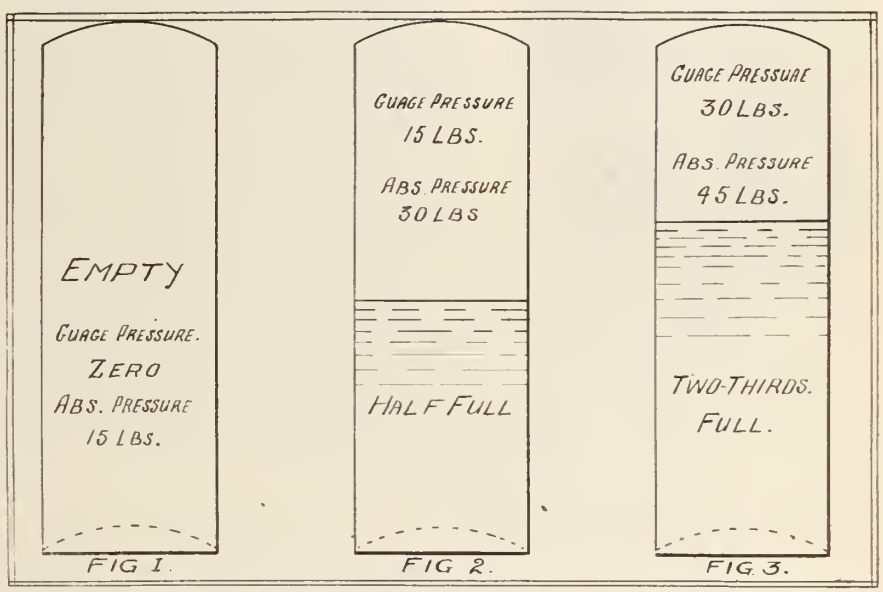
THE term pneumatic is more expressive than "compressed air," and is not as cumbersome, so it will be used. It would appear from the incidents which we have come across that the principles of pneumatic water storage and supply are not clearly understood. In one case, the attendant was told that he need not trouble himself as to the quantity of air that was in the tank, consequently the hotel authorities complained about the erratic and very fluctuating pressure and supply of water. Accidents have occurred with serious results, whereas a little more attention would have rendered everything safe and satisfactory.

The storage and supply of water under pneumatic pressure is very convenient, simple and sanitary. If properly maintained, it is always ready to afford a supply of water under pressure to all parts of a building; there is very little to get out of order, and adjustments can be quickly made. Dust and animals cannot get access to the water, as in the case of many ordinary tanks. Pneumatic storage tanks are usually placed in the basements or in a separate building, and consequently are ordinarily under better control.

There are a few points which must always be kept in mind, if the system of pneumatic water storage and supply is to be satisfactory. The quantity of air in the tank must always be maintained at a certain volume, according to the pressure required; say, from one-third to one-quarter of the capacity of the tank. This can always be observed by the gauge glass which is on the tank. When the quantity of air is less than a fixed quantity, then the attendant must see that it is replenished. Air is lost partly by leakage and partly by absorption by the water, somewhat on the principle of a soda water syphon.

The valves must be examined regularly and made to work freely and easily. All automatic appliances require to be periodically cleaned and tested, for in time most automatic parts get out of repair, become rusted, clogged, and do not respond readily to requirements, with the result that something unexpected happens.

Before we enter upon any calculations and formulae that must be considered later on, it will be well to have a clear conception of the principle of pneumatic storage and supply. Suppose an air-tight vertical cylindrical tank, having a capacity of, say, 100 cubic feet, or 625 Imperial gallons, were to be used for storage of water, Fig. 1. Before water was turned on, it would, of course, be full of air from the atmosphere. But atmospheric air at sea level is always under a pressure of about 14.7 pounds per square inch. As we climb up mountains this pressure decerases: so allowance must be made for different heights above sea level. For the sake of convenience in calculations we will assume the atmospheric pressure at 15 lbs. per square inch. This is known as the absolute pressure, whilst the gauge pressure is at zero. It is, therefore, necessary to bear in mind the difference between absolute and gauge pressure,—



Above drawings show exactly the pressure in pneumatic tanks when water is compressed from atmosphere. Additional air should be pumped into tanks with water to take care of absorption.

the absolute pressure being always about 15 pound per sq. inch higher or greater than the pressure indicated by the pressure gauge. Water is turned into the tank and as it fills the tank the air is being compressed. When the tank is half full of water, Fig. 2, the air has been reduced to one-half and now the pressure gauge will indicate 15 pounds, but the absolute pressure will, of course, as already explained be 30 pounds. When the tank is two-thirds full of water, Fig. 3, then the air has been reduced to one-third and the pressure gauge indicates 30 pounds, and therefore the absolute pressure is 45 pounds, and so on. We thus find that the volume of air is proportional to the pressure applied but always inversely—that is, the greater the pressure the smaller the bulk of air. This can be shown in another way. At the commencement we had 100 cubic feet at atmospheric pressure then 100 cubic feet of air x 15 pounds=1,500. When the tank was one-half full of water there were then 50 cubic feet of air at 30 pounds=1,500, and when the tank was two-thirds full of water, there were then 33.33 cubic feet of air at 45 pounds=1,500. When the water is let out again, we shall find that the absolute air pressure will diminish as the bulk increases. If the air is compressed sufficiently it will become liquid but we are not concerned with that interesting problem now.

Here is another point in connection with the compression of air. When it is compressed the temperature of the air rises and in ordinary compressors means must be taken to absorb the heat generated. When compressed by water such heat is automatically absorbed

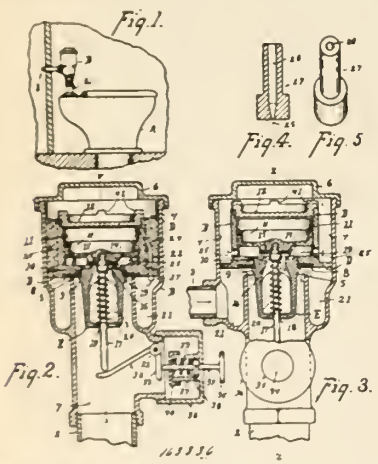
(Continued on page 28.)

New Canadian Patents

No. 163,336—Flushing Valve

Stephen G. Skinner, Chicago, Illinois, assignee of Joseph G. Perkins, Cincinnati, Ohio, both in the U.S.A., 22nd June, 1915; 6 years. Filed 14th April, 1915. Receipt No. 250,586.

Claim.—1. In combination, a casing provided with inlet and outlet openings, a valve seat interposed between said inlet and outlet openings, a floating piston the position of which is wholly determined by the differences in fluid pressures exerted thereon movable in the casing toward and from said seat constituting a valve to co-operate with the seat, said piston valve having a portion of one surface thereof exposed directly to pressure from said inlet openings, and a relatively greater area of an opposite surface normally exposed through a restricted communication to pressure from the inlet opening, whereby said piston is normally held seated, a fluid passage



adapted when open to release pressure from the larger area of said piston a valve seat in said passage, and a floating auxiliary piston valve movable toward and away from said last-mentioned seat having a portion of one surface thereof and a relatively larger area of an opposite surface thereof exposed to fluid pressure from the inlet opening by restricted communication only, whereby said auxiliary piston valve is normally held seated, and manually operable means for unseating said auxiliary piston valve to open said passage.

2. In combination, a casing provided with inlet and outlet openings, a valve seat interposed between said inlet and outlet openings, a piston valve the position of which is wholly determined by the differences in fluid pressures exerted thereon co-operating with said seat, said piston valve having one surface thereof directly exposed to pressure from the inlet opening, and a relatively larger area of an opposite surface normally exposed to pressure from the inlet opening by restricted communication only, whereby said piston valve is normally held seated, a passage adapted when open to release pressure from the aforesaid larger area of said piston valve, a seat in said passage, an auxiliary piston valve for said seat having one surface thereof normally exposed to pressure from the inlet opening by restricted communication only, and an opposite surface of relatively greater area permanently exposed to pressure from the inlet opening by restricted communication only, whereby said auxiliary piston valve is normally held seated, and manually operable means for unseating the auxiliary piston valve to open said passage.

No. 163,354—Pump

William George Beatty, Fergus, Ontario, Canada, 22nd June, 1915; 6 years. Filed 10th April, 1915. Receipt No. 250,422.

Claim.—1. A pump standard comprising a stand and a spout head having a cylindrical part extending into the stand, the stand having a loose part, and means for attaching it to the stamp to form a clamp, which when slackened, will permit of the spout head being turned, and when tightened, will rigidly couple the stand and spout head together.

2. A pump standard comprising a stand, a spout head having a cylindrical part extending into the stand and a flange resting upon the top thereof, a handle bearer for the stand having a collar to embrace the upper end of the spout head, and a removable part for the stand to engage the cylindrical part of the spout head.

3. A pump standard comprising a stand, a spout head having a cylindrical part extending into the stand with a peripheral groove therein, a removable part for the stand formed with a bead to enter the peripheral groove, and means for securing the removable part to the stand to lock the spout head in its adjusted position.

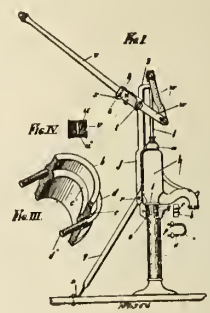
4. A pump standard comprising a stand having a removable part with a bead on its inner face, a spout head having a cylindrical part extending into the stand with a peripheral groove therein to receive the bead of the removable part of the stand, and means for locking the removable part to the stand and forcing the bead into said peripheral groove.

5. A pump standard comprising a stand having a removable part and an annular bead on the inner face of the stand and said removable part, and a spout head having a cylindrical part extending into the stand with a peripheral groove to receive said bead.

6. A pump standard comprising a stand having a removable part and an annular bead on the inner face of the stand and said removable part, a spout head having a cylindrical part extending into the stand with a peripheral groove to receive said bead, and apertured lugs for said stand, and a clevis embracing the removable part and extending through said lugs.

7. A pump standard comprising a stand having a removable part and an annular bead on the inner face of the stand and said removable part, a spout head having a cylindrical part extending into the stand with a peripheral groove to receive said bead, and a handle bearer for said stand having a collar to embrace the upper end of the spout head.

8. A pump standard comprising a stand having a removable part and an annular bead on the inner face of the



stand and said removable part, a spout head having a cylindrical part extending into the stand with a peripheral groove to receive said bead, a handle bearer for said stand having a collar to embrace the upper end of the spout head, a pump rod extending through the top of the handle bearer, a handle socket fulcrumed to the handle bearer, and a link connecting the handle socket with the pump rod.

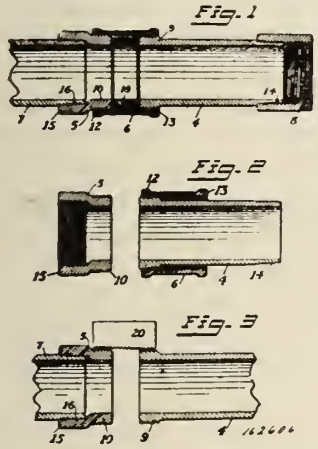
9. A handle socket for a pump comprising a receptacle having three integral sides and a removable side with clamping bolts extending through the removable side and the opposite integral side to clamp the handle within the socket.

10. A pump standard comprising a handle bearer having a slot in its lower end and a brace having its upper end contained in said slot and bolted to the handle bearer.

No. 162,606—Pipe Joint

Edwin Bahr, New York City, New York, U.S.A., 18th May, 1915; 6 years. Filed 29th March, 1915. Receipt No. 249,855.

Claim.—1. In combination with a pair of aligned pipe members, such as a threaded pipe and a connection internally threaded so as to fit the pipe, of a coupling nipple having its shank similar to the line pipe and threaded at the rear end to fit the line connection, the coupling nipple having its other end enlarged and externally threaded, such enlargement tapering inwardly, a coupling sleeve having an internal thread tapering from one end to the other and adapted to engage the said enlarged end to the coupling nipple to lock thereon at its smaller end portion, and an extension sleeve having a reduced end whereby inner and outer shoulders are provided at its middle portion for engagement respectively with the said pipe member



and said coupling nipple, said extension sleeve having its reduced portion tapering toward the end thereof and externally threaded to engage in the large end of the threaded bore of the coupling sleeve, said extension sleeve having its bore threaded at the larger end portion for engagement with the said threaded pipe member, said extension sleeve having the bore of the reduced portion in alignment with the said pipe member and with the bore of the said coupling nipple.

2. In combination with a pair of aligned pipe members, such as a threaded pipe and a connection internally threaded so as to fit the pipe, of a coupling nipple having its shank similar to the line pipe and threaded at the rear end to fit the line connection, the coupling nipple having its other end enlarged and externally threaded, such enlargement tapering inwardly, a coupling sleeve having an internal thread tapering from one end to the other and adapted to engage the said enlarged end of the coupling nipple to lock thereon at its smaller end portion, an extension sleeve having a reduced end whereby inner and outer shoulders are provided at its middle portion for engagement respectively with the said pipe member and said coupling nipple, said extension sleeve having its reduced portion tapering toward the end thereof and externally threaded to engage in the larger end of the threaded bore of the coupling sleeve, said extension sleeve having its bore threaded at the larger end portion for engagement with the said threaded pipe member, said extension sleeve having the bore of the reduced portion in alignment with the said pipe member and with the bore of the said coupling nipple, said extension sleeve having its reduced portion tapering toward the end thereof and externally threaded to engage in the larger end of the threaded bore of the coupling sleeve, said extension sleeve having its bore threaded at the larger end portion for engagement with the said threaded pipe member, said extension sleeve having the bore of the reduced portion in alignment with the said pipe member and with the bore of the said coupling nipple, and a washer interposed between the reduced end of the extension sleeve and the end of the coupling nipple to form a substantially continuous bore for the device.

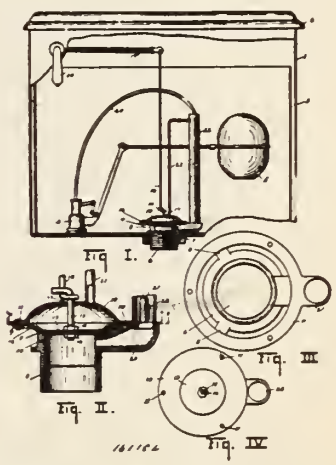
3. In combination with a pair of aligned pipe members, such as a threaded pipe and a connection internally threaded so as to fit the pipe, of a coupling nipple having its shank similar to the line pipe and threaded at the rear end to fit the line connection, the coupling nipple having its other end enlarged and externally threaded, such enlargement tapering inwardly, a coupling sleeve having an internal thread tapering from one end to the other and adapted to engage the said enlarged end of the coupling nipple to lock thereon at its smaller end portion, and an extension sleeve having a reduced end whereby inner and outer shoulders are provided at its middle portion for engagement respectively with the said pipe member and said coupling nipple, said extension sleeve having its reduced portion tapering toward the end thereof and externally threaded to engage in the larger end of the threaded bore of the coupling sleeve, said extension sleeve having its bore threaded at the larger end portion for engagement with the sair threaded pipe member, said extension sleeve having the bore of the reduced portion in alignment with the said pipe member and with the bore of the said coupling nipple, the internal threads of the extension being of a different pitch from the external threads on the extension sleeve and from the threads of the coupling.

No. 161,104. Flushing Valve.

Carl H. Zuermann, Kalamazoo, Michigan, U.S.A., 2nd March, 1915; 6 years. Filed 27th July, 1914. Receipt No. 241,658.

Claim.—1. In a valve of the class described, the combination of an outlet connection having a valve seat, a ring integral with said outlet connection, discharge openings between said ring and said valve seat, an arm extending from said outlet connection and having a discharge passage therein opening into said outlet connection beneath said valve seat, a chamber having a restricted inlet supported on said ring, an overflow pipe carried by said arm the lower end of said overflow pipe opening into the discharge passage, a siphon extending upwardly from said chamber and passing through the side wall of said overflow pipe near the top thereof, the discharge leg of said siphon extending downwardly within said overflow pipe to a point near the bottom thereof, a diaphragm valve forming the bottom wall of said chamber and normally engaging said valve seat, said valve comprising a diaphragm, a disc disposed above said diaphragm and a disc disposed beneath said diaphragm, a rod passing through said discs and said diaphragm, nuts threaded on said rod for clamping said discs to said diaphragm, said rod passing through the top of said chamber, and means for lifting said rod, all co-acting substantially as described and for the purpose specified.

2. In a valve of the class described, the combination of an outlet connection having a valve seat, a suitably supported chamber having a restricted inlet open-



ing, an arm extending from said outlet connection and having a discharge passage therein opening into said outlet connection beneath said valve seat, an overflow pipe carried by said arm, the lower end of said overflow pipe opening into said discharge passage, a siphon extending upwardly from said chamber and passing through the side wall of said overflow pipe at point near the top thereof, the discharge leg of said siphon extending downwardly within said overflow pipe to a point near the top thereof, the discharge leg of said siphon extending downwardly within said overflow pipe to a point near the bottom thereof, a diaphragm valve forming the bottom wall of said chamber and normally engaging said valve seat, said valve comprising a diaphragm, discs disposed about and below said diaphragm, a rod passing through said discs and said diaphragm, nuts, threaded on said rod and clamping said discs to said diaphragm, and means for lifting said rod, all co-acting substantially as described for the purpose specified.

(Continued on page 30.)

THE SANITARY ENGINEER

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DECEMBER 15, 1915

THE CLOSING YEAR

THE year 1915 has nearly passed away, carrying with it its cares, sorrows, pains, successes and failures, and carrying away with it, shall we say millions of men, whose lives have been recorded in the great beyond, whose battle for life and liberty has been fought and eternal rest has been won.

How have we fared? Are we more serious? Are we more earnest? Have we put on the whole armor of light and decided to fight the good fight of faith for the future of our beloved country? Or are we going to be ravagers of her resources for personal gain?

That is the question.

"Who serveth others, serveth self," is just as true and prophetic as Bobby Burns' "Man's inhumanity to man makes countless thousands mourn."

The business man no less than the workman, who takes the above quotations to heart, making each word and action harmonize with thoughts of service and brotherly love during the coming years cannot help but succeed. This dreadful war could not have come to pass

"If all mankind could have been combined,
and owned each man a brother."

But somehow it had not to be and what is happening to-day on the field of battle, is also happening in no less a sense on the business field of action.

The reason we are at war to-day with the Teutonic race is because of the latter's desire for power, more power.

Not one spark of the religion of the brotherhood of man can be found in such words or actions which have culminated in this war. When it was first started no one knows. It was certainly not in 1914.

War is something which has to be fought to a finish if there shall be everlasting permanent peace, and if right prevails there will be peace for both the vanquished just as much and no more than for the victors. Both will so far be victors.

It is the same exactly in our business life.

To be truly successful in business, does not necessarily mean, the survival of the fittest. The financially successful businessman can and is 999 times out of 1,000 an absolute failure. His success dies with him. The success of the German businessman was looked upon as almost miraculous. Thousands of businessmen have quoted the wonderful capabilities of the men around the Kaiser. But what has happened? What real success have these men or even the whole German empire accomplished?

So, in the coming year let us keep in mind that we need to be ready to serve. Serving others as we would serve ourselves, no more and no less. Giving fair value and demanding same, using the same eyes, when buying as we do when selling. Doing all we can to kill the law of the survival of the fittest, believing that each should be given all assistance possible to survive. Such business conduct will no doubt bring about the days when wars shall be no more.

BUSINESS OUTLOOK

IT is a very common thing to hear one say at this season of the year, "Well, I wonder what business is going to be like next year?" and many are asking themselves that very question.

From reports received from all over the Dominion we believe we need have no fear for the future, if we take care and plan for business.

This is a period when business is very largely what we make it; and it can be made good if each business man will do a little deep thinking and planning.

No trade received such a shock as did the sanitary and heating business when the war broke out. Yet reports prove that business is steadily improving, and is not by any means as bad as it was a year ago. The business outlook grows brighter and brighter every day, and will continue to do so if those engaged in the trade keep everlastingly at it.

One firm of w.c. tank manufacturers reported to The Sanitary Engineer recently that they had orders for delivery this month which would make December, 1915, the best month for a long time, certainly a great improvement over December, 1914.

One reason for business picking up somewhat with this trade is that quite a number are really getting after business, a thing very seldom done before. In view of these facts there is without doubt a brighter outlook to-day than a year ago. Canada is richer than ever, as the recent over-subscribed loan clearly proves. If such a loan had been put on the market a year or two ago, it is very doubtful whether it would have been financed as quickly, simply because there was too much inflated speculation in the air. To-day more money is coming into the country than ever before and is being spent too in one way or another. Not necessarily in land or real estate, for such expenditure does not tend to make a country prosperous by any means.

The way to increase our wealth is to increase the value of raw material and labor, by keeping our factories going. Of course we are aware that the war is absorbing a lot of men, but look at the thousands of non-producing speculators who flooded the country until lately. These have had to work. Our sons are getting older. Women are taking a hand on the labor market and still more can be absorbed. Like idle machinery, our industries will depreciate far more if at a standstill than if working. We must keep our factories going so that when the war is over our boys will come back to take their places finding business as usual.

WHAT IS ECONOMY?

DURING the past few weeks men holding big positions, men of letters, etc., have been urging economy. Prof. Wrong urged that we should eat less, buy a suit less. Wear our boots through to the uppers, wear less expensive clothing, and so on. To sum up an article from his pen Prof. Wrong would have us all turn into a veritable band of hoboes. But would taking such advice result in economy? We doubt it. There is another side to this question—that of the cost of doing without. If Professor Wrong has ever gone hungry to bed, ever worn clothing too thin to keep Jack Frost out of his bones, he would be slow to advise such trivial economies. And if such men as Mr. H. V. Meredith, president of the Bank of Montreal, as well as his worthy general manager, Sir Frederick Williams-Taylor, had looked thoroughly into the rash municipal undertakings in which millions have been squandered and done all in their power to prevent such waste of money, they would have been putting into practice real economy.

Montreal and Toronto have been allowed to squander money, and never one word of warning from these men of finance, but the moment our country is brought face to face with such a catastrophe, the wage earner is asked to put up with all kinds of discomforts, so that bank deposits may swell.

Nothing would result in more practical economy than to have such men as are at the head of our banks, placed in the position of municipal business managers, providing they would curtail unnecessary expenditure. The City of Toronto could very well do without a fifteen million dollar station.

If large undertakings were not financed by the banks, which are in reality the wage earners' savings, there would be more people left to develop our vast agricultural areas. A city undertaking large developments creates work for a lot of people who would or could be otherwise engaged in agricultural development.

This is the only way to bring down the high cost of living. No trade paper has done more in urging its readers that they could play a most important part in the back to the land movement than has The Sanitary Engineer.

The General Manager of the Bank of Montreal referred to the same thing in a speech he made at the general meeting. He said:—

> "Canada's greatest wealth lies at her feet, her economic future is bound up in the development of vast agricultural areas of unsurpassed fertility. The rate at which that development can be accelerated is dependent upon the rate of increase in our farming population. In natural sequence immigration can best be attracted to the Dominion by reducing and keeping down the cost of living. That in my opinion is the key to the whole economic situation.

But to follow out Prof. Wrong's suggestions would be like stopping the clock to save time. The cost of doing without would be too great.

And, if we were called upon to answer what real economy is we would endeavor to show that we should buy wisely, and not too well. We should not waste any of our resources, but rather strain every nerve in devloping our natural resources. We should build up more big villages and fewer big cities. We should make every move count in the labor world, and when we make any article it should be made in such a way as to give a maximum of service. If we build a home, it should be built well so that cost of upkeep would be small.

Most of our buildings to-day become an everlasting liability instead of an asset.

In a Y.M.C.A. building erected a little over two years ago the plumbing costs upward of $1,000 per year for repairs.

$1,000 will pay 5 per cent. on a $20,000 investment. That plumbing is eating up the proceeds from a $20,000 investment. Lack of economy!

These are questions which should be taken up, and if taken up at the right time will result in real economy.

Analysis of Canadian Plumbing Bylaws

Proposed New Plumbing By-law for Montreal—Many Clauses Not Only Ridiculous, But Impracticable, Proving That Sanitary Engineers Should be Consulted in Such Matters—The Sanitary Engineer Takes Full Responsibility for the Criticism Published in This Series of Articles.

ARTICLE 8.

IF the commenting upon this proposed plumbing by-law proves one thing more forcibly than another, it brings out the proofs that what is really wanted in the sanitary engineering trade is a uniform plumbing code, generally applicable to the whole Dominion.

And while provincial plumbing by-laws would be a step in the right direction, it is only practically one step.

If every province had a plumbing by-law to-morrow, we should still have serious breakers ahead.

This assertion is beyond argument, and both manufacturers and sanitary engineers will agree with it. Lacking a Dominion plumbing code, economic efficiency cannot be arrived at.

To have a number of acknowledged practical terms, when speaking of various fittings, would be a boon to the trade. The term "down pipe" may mean almost any kind of vertical pipe, though we know in Montreal this term means "rain water leader," but the latter term specifies what is really meant, and wherever used could not be misunderstood.

We will now continue our comment, eginning where we left off in our last issue.

Traps, Foot Stacks

Section 681.—Excepting as is provided for in these rules for down pipes, no trap shall be placed at the foot of any vertical soil or waste pipe.

Traps Intercepting

Section 682.—Excepting as provided for in these rules, intercepting traps are prohibited.

Minimum Size of Traps

Section 683.—No fixture shall have a tray of less than one and one-half inches (1½ in.) internal diameter.

Range Traps

Section 684.—A group of closets or a group of urinals may be served by one trap. One trap may serve two sectional basins.

Referring to Section 681, we do not see any reason why down pipes should be referred to in this matter. Such a section is apt to confuse a person. It is well known that no trap should be placed at the foot of a soil or waste pipe, then why make any such exceptions.

Section 682 is another instance where unnecessary exceptions are being made. If certain laws are laid down regarding how, when or where an intereepting trap shall or shall not be installed, that law should suffice, without making a lot of meaningless exeeptions.

It will be seen that section 683 demands that no less than 1½-inch traps shall be used. This is going a little too far. We see no reason whatever why a wash basin in a house should be larger than 1¼ inch. It could, however, be left to the option of the owner or builder whether he use 1½-inch. If this section is enforced, no 1¼-inch traps will be allowed in Montreal.

We find that section 684 is apt to cause confusion, and furthermore, these very questions are embodied in a previous section.

Of course, if Montreal desires to allow range closets and urinals of the trough pattern, then one trap would be all that could be demanded. And, as far as a stall urinal fixture, very little objection can be taken to such a fixture being fitted up with one trap because it is one fixture. But such a fixture should be furnished with running water, which should be kept running continuously.

Regarding a range of w.c.'s; well, they belong to the pre-historic age of sanitary science and should not be allowed any further existence. They are not acknowledged as a sanitary appliance and should not be resurrected in these days of progress.

Further, with reference to the trough pattern of urinal, they should be under special inspection, because past experience proves that this type of urinal is often allowed to become filthy, neglected and an insanitary nuisance; and if an inspector found that such fixtures were allowed to become insanitary, he should be given power to order them taken out, after fair warning had been given to the owners or occupants.

GENERAL

Ventage

Section 685.—To provide adequate circulation of air, to prevent back pressure, and to prevent syphonage, special air pipes of galvanized wrought iron or of east iron shall be provided, and, excepting as provided for herein, they shall be of a bore not less than that of the trap served, and if to serve a water closet or slop sink, not less than two-inch bore.

With above section we find no fault, it being of a general nature. The following sections are of greater interest, and will require following more closely:

Vents to Roof

Section 686.—All vent or air pipes shall be run separately or combined through the roof and for one foot above, and be left open.

Vent, Fittings and Coating

Section 687.—Except as provided for in these rules, all vent pipes shall be galvanized wrought iron pipe, and all fittings to the same shall be galvanized.

Vents, Direct as Practicable

Section 688.—Ventilating pipes must be run with as few bends as possible, and excepting as provided for, must connect with the main vertical vent at an angle of 45 degrees.

Vents, Regulating Size

Section 689.—When combined, the vent pipe must be increased in size according to the following table. Branch vents serving water closets shall not be of a smaller size than defined in the following table:

Table of Sizes of Vents and Branch Vents, Size of Vents and Fixtures Allowed

1 to 3 water closets or 7 small fixtures into a 2-inch vent.
1 to 5 water closets or 10 small fixtures into a 2½-inch vent.
6 to 8 water closets, or 16 small fixtures into a 3-inch vent.
9 or more water closets, or 16 or more fixtures into a 4-inch vent.
1½-inch vent pipes shall only be allowed for as herein provided.

Section 686 would at first lead the reader to conclude that it means what it says, but the following sections 687 and 688 make a number of exceptions:

Regarding Section 686, which in reality is a subject coming under what

might more practically be termed pipe terminals, we would refer our readers to the December 1st issue.

The article entitled "Interesting Pipe Terminal Experiments" is well worth deep consideration. It deals very fully with such questions as those now under consideration, and would be almost quite as applicable in Montreal as in Winnipeg. This being the case, all pipe terminals should be increased to at least two sizes larger—viz., a 4-inch to a 6-inch, a 3-inch to a 5-inch, a 6-inch to an 8-inch, and so on.

Another thing, no pipe terminal should be allowed longer than one inch. The day is long past when long towering lengths of soil or vent pipes should be allowed.

And where there are windows situated in such a way as at present renders it necessary to install long pipe terminals, these latter should be run to the interior of the higher portion of the building, so as to make it possible to apply the same type of pipe terminal as is now in use in Winnipeg.

Without doubt the adoption of this pipe terminal would be a step in the right direction.

Closets Double Y-Vent

Section 690.—Vents serving two water closets discharging into a double branch Y, or its substitute, shall not be less than a 3-inch vent pipe.

Vent One and One-half Inch Single

Section 691.—Single one and one-half inch traps may be vented with one and one-half inch vent pipes.

Sediment Provisions

Section 692.—All vent pipes and the fittings to same shall be arranged so that no sediment shall collect therein, but the sediment shall discharge into the wastage pipes so as to be carried off by the wastage discharge; and where architectural conditions require, then the bottom of the vent shall be carried to and connect below the lowest fixture on the line.

Another thing very typical of this proposed plumbing by-law is the number of exceptions and contradictions; for instance, the table which forms part of Section 688.

The first part of table allows from 1 to 3 w.c.'s or 7 small fixtures into a 2-inch vent.

Whereas, Section 690 demands that where two w.c.'s are connected into a double Y (or its substitute), which could not be other than two single Y's, then a 3-inch vent is called for. As a matter of fact, if two w.c.'s were connected to a double Y and were no more than 24 inches from the soil pipe stack, providing also that these two fixtures were the only ones on the vertical stack, there would be no practical reason for more than one of the w.c.'s being vented, and one 2-inch vent pipe would be ample.

Of course, there would be no harm done by having both w.c.'s vented; but it would certainly be superfluous to demand a 3-inch vent under the circumstances named.

The wording of Section 692 seems a little vague, but is, we think, meant to convey the idea that the vertical vent pipe stack shall be connected at the foot of the soil pipe stack, below the lowest fixture. It is one of those sections which could be better defined by a few examples of drawings, showing various methods by which the difficulties arising from different conditions may be successfully overcome.

Vent Pipe Intersection

Section 693.—In no case shall a vent pipe serving any fixture intersect with a main or branch vent at a point of intersection less than 3 ft. 6 in. above the floor level of the fixture or fixtures served.

To the above section it might not have been out of place to have added "or not less than one foot above the overflow of the fixture which vent is to serve."

The writer has in mind conditions where a sink has been set as high as 3 ft. 2 in.; that would mean that water in the sink when full would be 3 ft. 2 in. high.

While on the other hand, there may be cases where the vent from a bath trap would cause a lot of trouble if it had to be carried 3 ft. 6 in. above the floor level. If a vent is branched one foot higher than the highest possible watel level when fixture is full, it would mean that often such a vent could be carried under the sill of a bathroom window, which, if section 692 be enforced, may possibly result in the vent having to be carried away up over the window, and in such a case all the vents would have to be similarly carried, or else separate vent fittings would have to be inserted in the slack to overcome the trouble.

One very important thing which should not be lost sight of, is to compile by-laws that will make it possible to eliminate as many joints as possible.

Soil Drop Ten Feet

Section 694. — Excepting water closets discharging into a double branch Y, all water closets, basins, baths or any other fixture, if the soil pipe drop does not extend ten feet, may be vented by a 2-inch vent pipe for a distance of 35 feet; if exceeding 35 feet, then the entire vent shall be 2½ inches. Single water closets may be vented by a 2-inch vent pipe.

Soil Stack at Least One

Section 695.—In every building where a water closet or closets is or are situated, it shall be required in all cases that at least one 4-inch vent pipe shall be continued to a point one foot above the roof line, irrespective of the location of the closet or closets or drop.

Section 694 is not quite as clear as it might be, and would be made very much clearer by a drawing.

Section 695 is a little unreasonable, and would prove expensive in many ways.

For instance, in a 3-storey warehouse, with simply one w.c. situated in the basement, it would not be necessary to run a 4-inch vent from the w.c. lead bend up to the top of roof. The same applies even in the case of a stable with loft over. The running of a 4-inch cast iron pipe up through the roof would be altogether out of reason, and make such an installation too expensive.

In such cases all that would be necessary would be to place a 2-inch vent on, run it to the roof and terminate with a 2 x 4 increaser. Another thing, it would be just as well to place a 4-in. Y and 4 x 2 reducer, the 4-inch branch of the Y to have a 4-inch clean-out inserted into it.

Branch Vent Three Feet Six Inches

Section 696.—In all cases where vents branch into another, the branch fittings must not be less than 3 ft. 6 in. above the floor level of the fixture or fixtures served.

One and One-half Inches Vent

Section 697.—When one and one-half branch vents are used on fixtures, the branch vent shall not exceed ten feet horizontally.

It will be seen that section 696 is nothing but a repetition of section 693. Neither of which section do we agree with, and have given our reasons in our comments on section 693.

Section 697 is too important a one to set aside with so few words. It will be seen that if a 1½ in. vent is used, it cannot be more than ten feet long, running horizontally.

Then, what size will be allowed? Should it be 2-inch, 2½-inch, or 3-inch, or what? Because if the sanitary engineer installing a job were to take the risk of judging for himself, he may find he would have to pull any size out, seeing that no other size is suggested, or even demanded. The fact is if 1½- inch is not allowed, what size would be allowed? This should be clearly defined so as to cause no misunderstanding.

(Continued in next issue.)

New Sanitary and Heating Goods

ADJUSTABLE ANGLE WRENCH

The Imperial Tool Company, of Bloomington, Illinois, have recently brought out an adjustable handle angle wrench. The makers state that the wrench incorporates a number of advantageous features. The adjustable jaw will take any tap up to $1\frac{1}{4}$ in. at eight different angles, or the tap can be turned in very close quarters by ratcheting the handle one or more notches at a time in either direction, by simply pressing the ratchet button. When the button is released, the handle is locked rigidly.

This wrench will take the place of many different sizes, styles and types of wrenches. It is easily operated in positions and angles where no other wrench can be used. The makers also state that

The adjustable angle wrench.

it is not a novelty wrench. It is a practical tool—made of the best material and will stand the hard usage.

It is particularly adaptable for auto kits, garages, machine shops and innumerable places where a high grade and all-purpose wrench is desired.

SCREWDRIVER DISPLAY

The Peck, Stow & Wilcox Company, Southington, Conn., is now offering to the retail hardware trade a screwdriver display rack.

This selling aid is designed to show to advantage Pexto Solbar screwdrivers, a solid bar tool that stands up under hard usage, and has a bearing surface that prevents the hand from slipping.

The fixture is of handy size, 9 x 12 inches, and made to stand or hang. It is constructed of metal and enameled in colors, orange, blue and white, the lettering being in black. The tools are arranged on the rack to show the different talking points. A spring-clip ledge holds the screwdrivers firmly in place. These display racks usually are first used in the window, after which they are hung up or stood on the counter inside the store.

Peck Stow & Wilcox Screw Driver Display Rack

AYLMER PUMPS

For a number of years the Aylmer Pump & Scale Co., Ltd., Aylmer, Ontario, have manufactured force and lift pumps of various kinds, continually adding to their lines from time to time. One of the latest to be added is that of the Aylmer series No. 1500. It being one of the many chosen as a result of extensive deliberations on the part of Mr. J. A. Sutton. A view of this pump is shown in these columns.

The working parts, valves, air chambers, cylinder and piston being described by phantom lines.

Further particulars may be had upon writing to the above company.

The Aylmer—No. 1500.

TRUE EFFICIENCY

Efficiency means more business—better profits. More business means using good plumbing material, for in that way only can the necessary confidence which means re-orders be inspired in your customers.

A Letter from the Editor to Our Readers

ANOTHER year has passed and gone, and our country is still at war. How is it affecting us? Are we doing our part faithfully? Are we conducting our business in a more thorough manner than we have done in the past? We know of many readers of the SANITARY ENGINEER who, though doing a less volume of business, have improved their methods of management. We know of others who have not. The war has played havoc with some, while others have put their spare time to good account. Hundreds, both journeymen and employers, have gone to the firing line and are fighting for those of us who cannot for various reasons follow them.

But none can excuse themselves if they do not fight against evil practices in business; none can justify themselves for price-cutting, or mismanagement of their business, and those who devote their time to putting their business into a more healthy condition are just as worthy of commendation as the man in the trenches.

The manufacturer who complains that he cannot demand a just price for superior goods and who is succumbing to the cry of those who make poorer quality stuff, is in actual fact no better than a weakling, blown first one way and then another by every shifting wind.

The manufacturer who sells high-grade goods for low-grade price, is to be pitied for lack of backbone. He should take an example from the fellow who is fighting in the trenches, and fight for his right. The quitter is always looked upon with a sneer.

If the British Nation has done one thing more than another the world over, it has raised the standard of living.

To raise the standard of living is to make this world's life worth while the living.

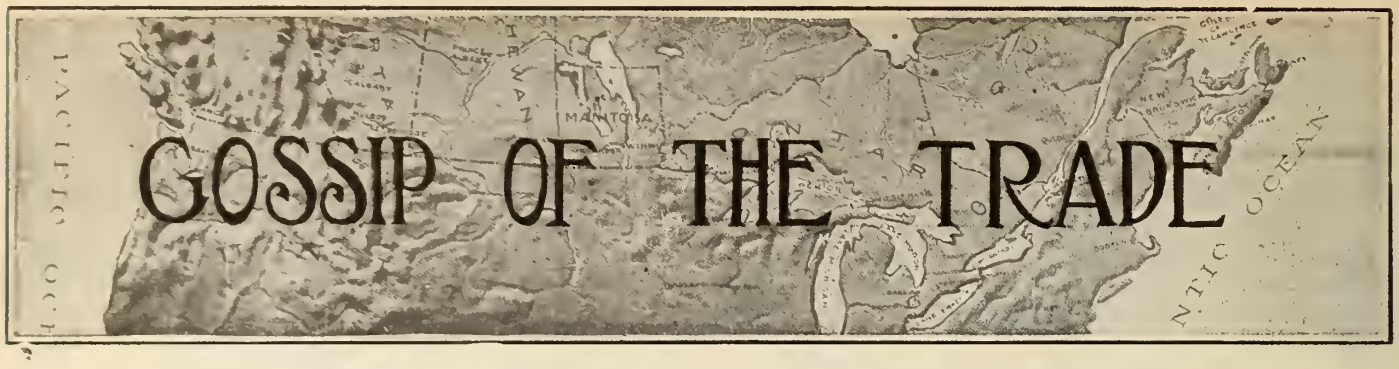
The same argument should be applicable to the goods we buy and use.
The manufacturer making high grade goods is taking an example from this nation and should be patronized and paid for his trouble.

But, the manufacturer of poor miserable low grade goods is trying to dope the market with his wares and is keeping the brake on progress. His actions say, "The life of the pre-historic man is good enough for me as well as the people I meet," and the buyer of such good is aiding and abetting his actions. No low-priced "just-as-good" products are honest goods, and the man who gets high grade goods at low prices is only cutting his business career to pieces. There never was a successful business which could be claimed as having been built up on price cutting or bartering.

The man buying dollar bills for 50 cents would feel guilty of robbery, and look upon the seller as a poor deluded simp; or else he would begin to doubt the quality of the bills. The same thing applies to goods.

Finally, let us urge upon our readers to fight earnestly against all schemes which do not ring true, methods which have their questionable side, and start right in with the coming year to demand the best, pay for it, and don't barter, such practices are not to be found in honestly conducted establishments.

EDITOR.



WITH THE MANUFACTURERS

One of the most important lines handled these days by the sanitary and heating engineer is that of the pneumatic water system.

Like plumbing at one time, these systems were looked upon as a luxury. The attic tank has held sway, and is being used now to some extent. It is, however being supplanted by the pneumatic system wherever service and practicability are taken into account.

When the pneumatic systems were first put upon the market, very little was actually known about them. Some outfits consisted simply of a common tank and pump, neither of which were suitable for the work they were expected to do. The tanks were simply ordinary steel cylindrical tanks, built by the ordinary boiler maker. But, it was found that special care had to be exercised in constructing these tanks.

The pump, too, being an ordinary force pump soon gave all kinds of trouble because of the fact that it was not built for pneumatic working. These pumps were not provided with proper means of supplying air along with the water without depreciating the lifting qualities of the pump.

To furnish the proper equipment required not only proper appliances, but also men who had studied this particular line, men who have been in direct touch with all these faults and failings of the systems first placed upon the market.

Among the few who have devoted much time and energy in putting reliable equipments on the market is J. A. Sutton. Mr. Sutton has spent nearly eleven years right next to this particular line. He first took up a line of pumps and pumping equipment with the Ontario Wind Engine Co., Toronto, in 1904, and he stayed with them for upwards of seven years, traveling all over the Dominion as their representative. The next move made was when Mr. Sutton became assistant general manager of the National Equipment Co., Toronto, at which time he moved from Winnipeg to Toronto.

The valuable experience gained in the two years in which Mr. Sutton was employed by the National Equipment Co., was certainly not lost, as those people with whom he did business will be willing to admit.

After two years, Mr. Sutton returned to his old love as it were, and introduced the pneumatic line of water systems to that of the already popular line of hand, gas, gasolene or wind-mill driven force and lift pumps, which the Ontario Wind Engine & Pump Co. manufacture. Traveling all through the U.S., he picked up a new line, mention of which is made on another page. This line was, we are informed, first introduced to the Canadian market by Mr. Sutton.

J. A. SUTTON,
representing Aylmer Pump and Seale Co.

This move, however, did not prove of long duration. After several months, the Aylmer Pump & Seale Co., Aylmer, Ont., acquired his services for the purpose of adding to their line of already popular pumps that of penumatic water systems.

Mr. Sutton now enjoys the confidence of his present employers as sales manager of the pneumatic water system department, but has also been placed upon the mechanical advisory board of directors.

His company are planning a very extensive trip throughout the western provinces and British Columbia, upon which trip he will take along with him actual full size working samples of the pneumatic systems.

The venture is somewhat novel because of the fact that it entails carrying with him goods weighing upwards of half a ton.

* * *

HEALTH ECONOMICS

The monthly bulletin issued by the Toronto Department of Public Health is performing a service along the line of conservation which might with advantage be emulated by other Canadian municipalities. In the last issue, under the sub-heading "Efficiency in Health More Necessary Than in Business," some very useful facts are stated. It instances the remarkable way in which tuberculosis, typhoid, and other diseases have been checked but adds the disturbing statement that degenerative diseases of the heart, arteries and kidneys, have increased 100 per cent. on this continent during the last thirty years.

The bulletin proceeds: "No intelligent community or nation can afford longer to disregard these degenerative diseases and their economic loss, occurring as they do at the period in which life is most valuable, in its most productive period. . . . If a business man were to look after his business in the slipshod sort of way that men look after their health how long would that business live?" There were some 7,500 deaths from cancer in Canada last year, most of these being persons 45 years of age or over. The essence of the article is that every man should be physically examined every six months. Even cancer is in most cases curable in its early stages. If an automobile is worth overhauling from time to time the human body is much more so, suggests this writer. "You can materially prolong the life of both by a regular examination and overhauling." This advice is in harmony with the practice of some life insurance companies, in their periodic medical examination of their policyholders. The terrible waste of life now going on through war makes this other waste appear even more indefensible. Conservation of health in Canada has now in view of present conditions unusual economic, as well as social and national aspects.

THE TORONTO TELEGRAM AND TECHNICAL EDUCATION

THE Toronto Telegram prides itself on being a workingman's paper. It aspires to voice the sentiments of the workingman (too often the sentiment of the workingman with his foot on the hotel bar-rail) and professes to be warmly concerned with anything which affects the welfare of labor. It will be difficult to reconcile the professions of friendship to labor with the following editorial utterance which appeared recently in The Telegram:

"The Toronto branch of the Canadian Manufacturers Association was utilized by the gentlemen who loaded up the taxpayers of this city with the creation and maintenance of an industrial university in the form of a Technical School. The Toronto branch of the Canadian Manufacturers' Association allowed its name to be used and its influence to be exerted by the lobby that placed a burden of almost $1,500 per day on the shoulders of the taxpayers in the Technical School account."

When we consider the exalted position which the Telegram has arrogated to itself as the champion of the workingman, it is difficult to understand its attack upon industrial education and upon the body which did so much to provide it.—Industrial Canada.

Commenting upon the above, let us add that the Telegram is one of those papers which is throwing more dust into the eyes of the working class than it needs to do.

But there is one consoling effect which will follow such a course, and that is that the more people learn and the better educated they become the more readers will the Telegram lose. The only reasons for the existence of such a muckraking paper are first the lack of education on the part of some of its readers, and second, the present-day demand for sensational piffle.

Of course the Telegram has to come out and say something so as to, in some measure, justify its champion Tommy Church, who called the new Technical School a "white elephant."

Some day not far distant, that white elephant will bear such a litter of elephants, far too intelligent to either read such piffle as fills the Tely or elects such a mayor as T. L. Church.

The workingman is coming to his own; he will become more efficient. He will soon be the "master man" and not the "hired help," and Canadian manufacturers know full well that technical education will help plant to greater production, will give workingmen a chance to do more work with less manual effort, will help the worker to return home after a day's work with a firmer and less worn-out step.

Technical education will give the wheels of socialism more speed and in the end bring about such real world-wide progress as never seen before. It will give more chances to every man to make good. It will raise the standard of living.

The workers of Toronto are responsible for two-fifths of the total productive value of the whole of the Province of Ontario, and at what cost? Technical education for the worker in Toronto will increase the output at a less physical and mental cost to all those who attend to and take advantage of all that is to be had at the new Toronto Technical School.—Editor.

Master Plumbers' Association of Montreal and Vicinity

THE annual meeting of this association was held in the board room of the Builders' Exchange on Wednesday, December 8. President A. Charette presided.

The minutes of the meeting held on November 10 were read and adopted.

Convener J. E. Walsh for the audit committee reported that his committee had examined the books of the association and had found these well kept and in order. In presenting a statement of their assets and liabilities he congratulated the association on the healthy state of the finances, considering the business of the year which was just about to close.

On the motion of W. R. J. Hughes it was unanimously agreed to accept and file the report as read.

Vice-president L. J. Conroy for the membership committee reported that during the last few months the president and himself had visited many plumbing firms who would make desirable members of their association, and that the prospects for the coming year were decidedly encouraging. The report was adopted.

John Watson, convener of the nomination committee, proposed the following members as office bearers for the year 1916:

Past President and Representative to the Builders' Exchange—A. Charette.

President—L. J. Conroy.

First Vice-president—Walter Ryan.

Second Vice-president—H. A. Brosseau.

Audit Committee—John Watson, W. J. Graham and R. J. McCauley.

Trustees—Jas. Griffen, Jos. Briard and John A. Gordon.

Convener of Sanitary Committee—P. C. Ogilvie.

Convener of Arbitration Committee—James Ballantyne.

Convener of Legislation Committee—Joseph Laurier.

Convener of Apprenticeship Committee—Jos. Thibeault.

Convener of Price List Committee—J. E. Walsh.

Honorary Secretary—W. R. J. Hughes.

Secretry—David K. Trotter.

Seconded by P. C. Ogilvie, the slate was adopted with acclamation.

The new president thanked the members for the confidence they had reposed in him, and assured them that his energies during 1916 would be devoted towards making their association a success.

The retiring president briefly thanked the members for the courtesy they had extended to him during his term of office.

After the new president, first vice-president and honorary secretary had been escorted to their respective chairs, the secretary was instructed to notify the conveners of all committees of their appointments as such, requesting them to have their committees formed by next general meeting, and to report accordingly.

On the motion of J. E. Walsh a unanimous vote of thanks was accorded to the retiring office bearers.

A letter to the president from one of the members was read intimating his resignation from the association. On the motion of the ex-president, seconded by J. E. Walsh, it was agreed that Messrs. W. R. J. Hughes (convener), L. J. Conroy, J. E. Walsh and James Ballantyne be a committee to interview the member regarding the same.

The following letter from the Assessor's Department at the City Hall was read:

The Master Plumbers' Association,
52 Victoria Square,
Montreal.

Re Municipal Electors' List

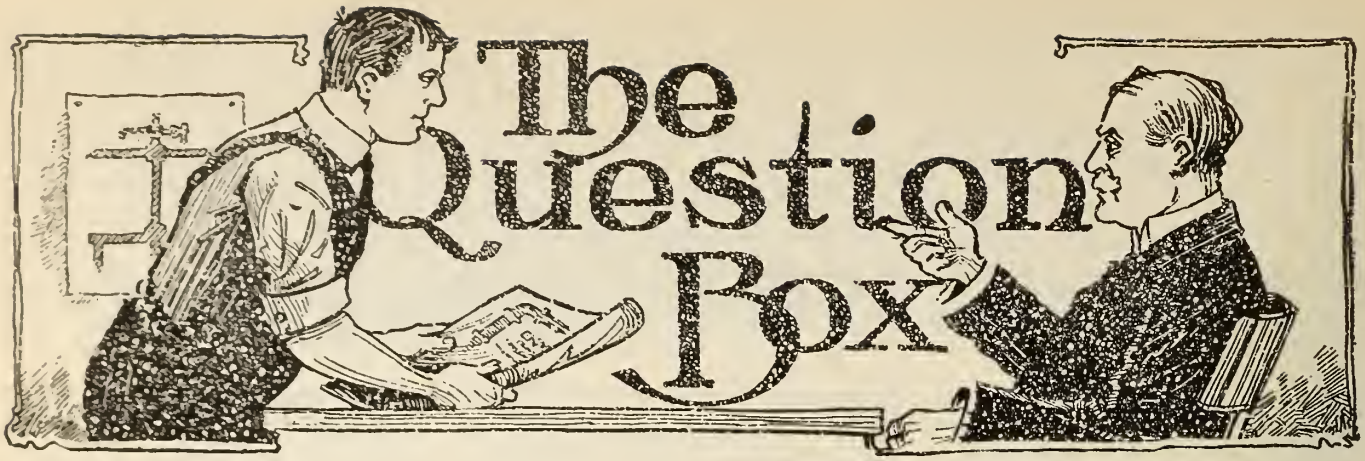
Gentlemen:

I am in receipt of your favor of the 16th inst., addressed to the City Clerk, and I regret to inform you that your Association is not entitled to be represented on the municipal voters' list, as it is not covered by Article 44a of City Charter.

Yours truly,
(Sgd.) J. Hamilton Ferns,
Chairman Board of Assessors.

W. R. J. Hughes, convener of the Plumbing By-laws Committee, reported progress.

The secretary was authorized to write John R. Meadowcroft a letter of condolence on behalf of the Association on the occasion of the death of his daughter.



Subscribers Are Urged to Send in Questions to be Answered, or to Comment on Letters Published—Description of Jobs Done or Shop Kinks Are Also Invited.

WHO MAKES THE ROYAL RECORD OAK HEATING STOVE?

Editor Sanitary Engineer:

Kindly advise, if you know or can find out, who makes the Royal Record Oak heating stove.

Hope & Son.
Perth, Ont.

The Record Foundry Co., Moncton, N.B.—Editor.

PROPER POSITION FOR COIL OR HEATER

Editor The Sanitary Engineer:

I have been called in to replace several coils and heaters recently which were installed in the fire pots of both warm air and hot water furnaces. These coils have burned out. Some were made of galvanized iron, and some of copper piping; while the heaters were made of cast iron.

These coils have been installed in such a position as to be covered with fire when fire pot is full of fuel. While the heaters were only a few inches—three at the most—above the fire.

I have always felt that larger coils or heaters should be used, and then not placed too close to the fire, and in seven years I have never had to replace one, either coil or heater. But my reason for asking you this question, Mr. Editor, is to settle a little dispute.

D. H., Alberta.

This is, of course, a very simple question, though it may be of interest to more than our inquirer. The very fact that in seven years he has not had to replace a heater, proves that good judgment has been used. No heater or coil should be less than 4 to 6 inches from the coal fire, and if there be not a sufficient supply of hot water, the amount of coil should be increased, or a larger heater installed.

While speaking of this matter it would not be out of place to cite an incident which came to the notice of the writer a few days ago.

A warm air furnace had to be taken down for repairs, the coil in the furnace had to be disconnected. The range boiler is situated in the kitchen above, and prior to the coil being disconnected, the water got so hot that steam would generate at times. But when the job was completed and coil replaced, it was found that no more steam generated, and while it takes a little longer to heat the water in the boiler, there is now plenty of hot water.

Upon examining the job, it was found that the fitter had crossed the horizontal pipes and the pipe at the top of the coil was connected to the bottom of the boiler, and the bottom pipe to side of boiler. It works OK, though it is of course connected contrary to all popular practice.—Editor.

COVER BREATHER AT SEPTIC TANK

Editor The Sanitary Engineer:

Last winter, I was called in to a country house where a septic tank was in use. The occupants of the house had not heard the syphon flush for several days.

I uncovered the dosing chamber and found that the sewage was overflowing through the pipe which leads to the subsurface tile and also the breather or vent, there was ice on top of the fluid which prevented the syphon from flushing.

I plugged the breather up; but did not feel quite certain that I had done right.

What do you think should be done in such a case?

Septic Tank.

This is a trouble not very often experienced, but is one which should be by all means guarded against. The cause of the freezing was no doubt due to the temperature dropping very low and possibly there had not been any sewage discharged from the fixtures for a whole day or so, and the cold air being pulled through the whole length of the stack to the roof would cause the freezing.

The breather should not be plugged because no fresh air can then get into the tank, and when the syphon is flushed there is apt to be a back pressure placed on the discharging sewage. The best and most simple way to overcome this trouble is to make a box about a foot higher than the top of the breather, fill the box with horse manure and straw and cover over the breather. Nail a couple of laths over to prevent the straw from blowing off.—Editor.

PNEUMATIC WATER STORAGE AND SUPPLIES

(Continued from page 17.)

and so we find no incerased temperature. Consequently the compression is made at constant temperature which is known as isothermal with isothermal compression the law governing the pressure and volume of air is known as the peevee law—P.V., namely pressure and volume, which, as already explained, always give the same answer when multiplied by each other.

We will next consider a pneumatic storage and water supply system installed in a building.

(Continued in next isue.)

NEEDLESS TORTURE

General Sherman once stopped at a country home where a tin basin and roller-towel sufficed for the family's ablutions. For two mornings the small boy of the household watched in silence the visitor's toilet. When on the third day the tooth-brush, nail-file, whisk-broom, etc., had been duly used, he asked: "Say, mister, air you always that much trouble to you'se'f?"—Christian Register.

A TUEC IS NOT A LUXURY

IT'S A NECESSITY TO ENSURE GOOD HEALTH

ALL things are possible when good health abounds in the home.

Tuec stationary Vacuum Cleaners are
Useful and sanitary,
Economical to operate and
Conducive to good health.

"Dust particles may contain thousands of bacteria which find entrance to the lungs with the air breathed. Dust in a room or covered conveyance is more dangerous than dust out of doors, where many of the bacteria are soon killed by strong sunlight, heat and rain."

Reprinted from Practical Sanitary Science, by H. L. Seymour, B.A.Sc., A.M. Can. Soc. C.E.

Write us at once. Improve your country's health and increase your own wealth.

THE UNITED ELECTRIC CO., TORONTO

159 West Richmond Street

TUEC was awarded Grand Prize at Panama-Pacific Exposition.

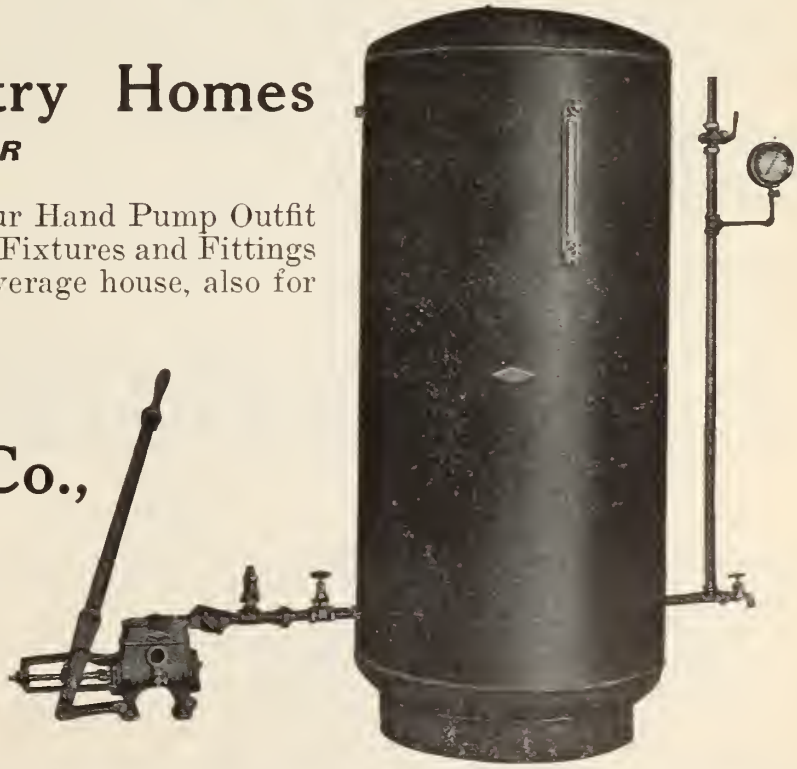
Stevens' Water Supply Systems

FOR

Town and Country Homes

NONE BETTER

Write for Catalogue illustrating our Hand Pump Outfit —Power Pump Outfits—Plumbing Fixtures and Fittings generally used for plumbing the average house, also for blueprint of septic tank.



We Make Prompt Shipments

The John Stevens Co.,

Limited

DEALERS IN

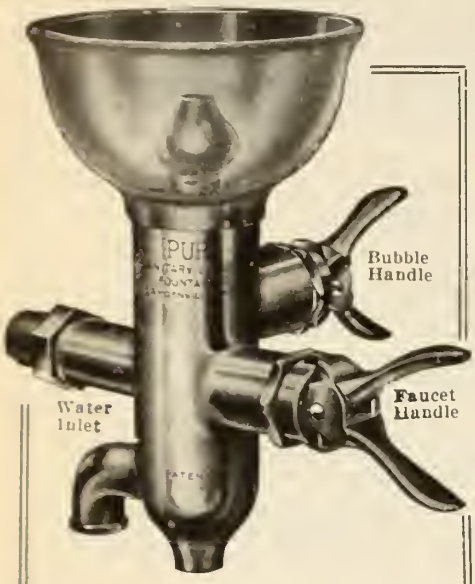
Plumbers' Supplies and Pneumatic Pressure Systems

661 Henry Ave. - WINNIPEG

I BELIEVE

In Safety First and always.
In providing for the Health of my Fellow Workmen.
In Light and Air and Sanitary Working Conditions.
In clean, fresh drinking water for everybody.
In the Safety, Economy and Man-betterment of the

PURO (MADE IN CANADA) **SANITARY DRINKING FOUNTAIN**



The loss of a man through impure drinking water is a crime that "the front office" must bear.

An ugly statement, isn't it? But true, absolutely.

When a man comes to work in your factory he puts his health in your keeping.

Are you willing to take chances on such a trust?

Impure drinking conditions are responsible for more tragedies than any machine ever built.

Apply the "Safety First" Principles to your water supply, don't deny your men a clean, fresh drink of water.

Conserve their health and they will improve your profits; mark yourself as worthy of the name of "Employer."

Install the Gold Medal winner Puro in your plant, office and shop alike.

The only Sanitary Drinking Fountain that is safe, sanitary, simple, automatic in control and easily attached.

Let us tell you just what it will cost you to

"PURO-FY"

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company

147 University Ave., Toronto, Canada

Consulting Sanitary Engineer

Advice and Plans on Water Supply and Sewage Disposal for Residences, Factories, etc.

H. L. SEYMOUR, B. A. Sc., A. M. Can. Soc. C. E.

BOX 95. SANITARY ENGINEER TORONTO

VENTILATION AND FRESH AIR

WITH the advent of the winter season, and consequent lower temperatures, comes the usual sealing-up process in the homes. A supply of fresh and pure air becomes secondary in importance to the exclusion of the colder atmosphere. The consequence is insufficient pure air to properly sustain life at its best.

The open air is the greatest disease-preventing and disease-curing agency in existence. The air we inhale daily is by weight twice as heavy as the weight of all the food and drink we swallow. A man may live for weeks without food, but only a few minutes without air. Much greater care should therefore be taken to supply to our homes, places of business, schools and public halls a sufficient amount of pure air.

Authorities agree that each adult requires 3,000 cubic feet of air per hour. On this basis the total air content of a room 10 x 10 x 10 feet should be renewed three times every hour. The secret of good ventilation is to renew the air in a room at least that often, day and night, without creating a draught. Owing to this danger it is necessary that the foul air be removed and fresh air admitted to inhabited rooms at such places as will not give rise to draughts. The simplest method of natural ventilation is that of more or less open doors or windows. As the most impure air in a room is at the ceiling, and the freshest at the floor, windows should be made to open from the top.

Winter and summer the bedroom window should never be closed when the room is occupied, except during very damp or foggy weather. Sleeping in cold air is not at all dangerous, if one is properly clad, although it may be so if protection be insufficient, and especially if the cold air plays upon the sleeper's head. The open window is quite as essential to a large bedroom as to a smaller one. It cannot be too often repeated that tuberculosis is not contracted by exposure to cold, as our sanitoriums are situated in the coldest and dryest climates. Dust and barly-ventilated houses and factories are the real cause of this disease. Sir Morell Mackenzie said, "The process of re-breathing air that has already been used, if long continued, leads to asphyxia and death. Short of this much co-called 'delicacy,' susceptibility to cold, langour, headache and nervous depression are also due to the same cause."

Canada is fortunately gifted with a bracing and healthy climate, resulting in the developing of a race of sturdy manhood. When pure and fresh air means so much in life, why shut it out from our homes, seal ourselves in and re-breathe the air from which we have already extracted and absorbed the life-giving element?—Conservation.

NEW CANADIAN PATENTS

(Continued from page 19.)

3. In a valve of the class described the combination of an outlet connection having a valve seat, a suitably supported chamber having a restricted inlet opening, an arm extending from said outlet connection and having a discharge passage therein opening into said outlet connections beneath said valve sea an overflow pipe carried by said arm. the lower end of said overflow pipe opening into said discharge passage, a siphon extending upwardly from said chamber and passing through the side wall of said overflow pipe, the discharge limb of said siphon extending downwardly within said overflow pipe to a point near the bottom thereof, a diaphragm valve forming the bottom wall of said chamber and normally engaging said valve seat, and means for lifting said diaphragm valve, all co-acting substantially as described for the purpose specified.

PARCEL RATES REDUCED

The Honorable T. Chase Casgrain, Postmaster-General of Canada, has been successful, as a result of negotiations entered into with the Imperial Postal authorities, in effecting an arrangement with the British Government whereby parcels from Canada for Canadian soldiers in France and Flanders will be carried at the same rate of postage as applies to parcels from the United Kingdom for the Expeditionary Forces on the Continent; that is:

For parcels weighing up to three pounds, 24 cents.

For parcels weighing over three pounds and not more than seven pounds, 32 cents.

For parcels weighing over seven pounds, and not more than eleven pounds, 38 cents.

This means a material reduction on the cost of parcels, and it is hoped it will be a source of satisfaction to the Canadian public. This reduction has been brought about by Canada foregoing all postal charges for the conveyance of these parcels in Canada and on the Atlantic.

The public are reminded, however, in accordance with the circular issued by the Department recently, that until further notice, no parcel can be sent weighing over seven pounds.

Post Office Department,
Ottawa, Canada.

You can put a stop to faulty hot water systems by installing

The Knickerbocker Generator

It is a positive remedy that is easily applied to the open or closed systems of hot water heating.

Entirely automatic.

Connects with one-inch nipple to outlet of expansion tank.

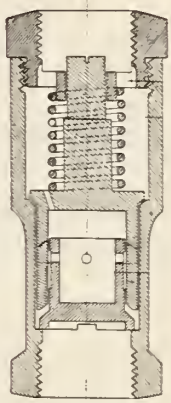
Makes a hot water system equivalent to a low pressure steam plant.

Increases radiation from 25 to 30% with same firing.

Reduces the size of pipes and fittings.

Temperature of water can be varied up to 250 degrees.

A top-notch profit producer.



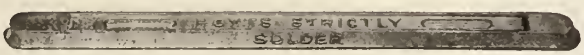
SECTION

Particulars on request.

The James Morrison Brass Mfg. Co., Limited

93-97 Adelaide St. West, TORONTO

Our Mixed Metal Sales Amount to Over $5,000,000 Annually



We wish to call your attention to the one grade of Wiping Solder manufactured by the Hoyt Metal Company. The reason for only the one grade is, that a superior alloy cannot be made for this purpose, and the Hoyt Metal Company refuses to manufacture an inferior alloy. A trial of this Solder will prove the above statement.

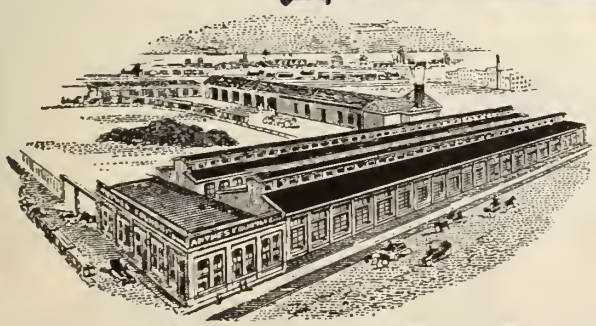
Special attention is called to our Bar Solders, Wire Solders, Lead Pipe, Waste, Traps and Bends.

Your orders will have prompt and careful attention, not sometimes—but all the time.

HOYT METAL COMPANY, TORONTO, ONTARIO

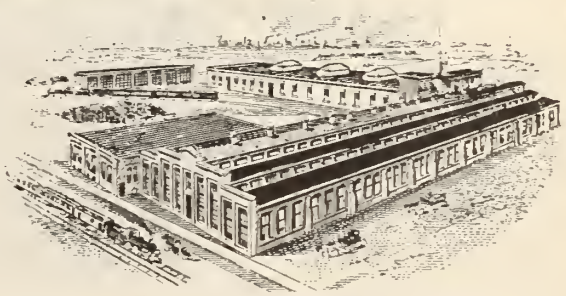
New York, N. Y.; London, Eng.; St. Louis, Mo.

TORONTO **ANTHES FOUNDRY LIMITED** WINNIPEG



MANUFACTURERS OF

CAST IRON SOIL PIPE AND FITTINGS



ALPHABETICAL LIST OF ADVERTISERS

Occasionally advertisements are inserted in the paper after the index has been printed. The insertion of the Advertiser's name in this index is not part of the advertising order. The index is inserted solely for the convenience of the readers of the paper.

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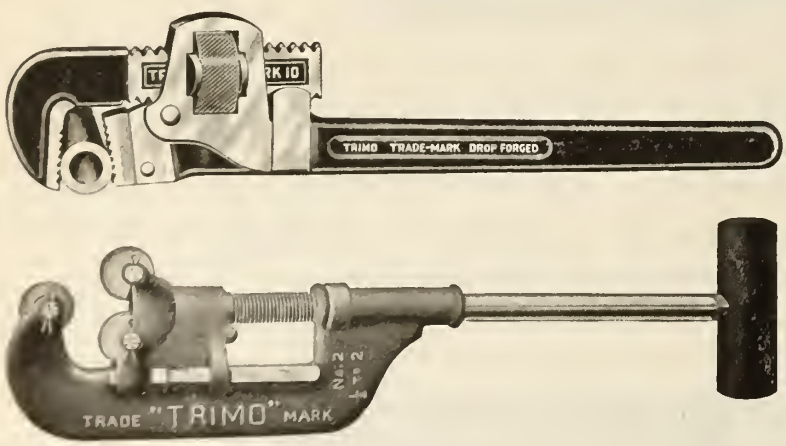
World-Famed Specimens of the Age of Steel

TRIMO



TOOLS

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The Hotstream MEALS IN A HURRY TRADE MARK REG. WATER HEATER

The most complete line of high-grade tank heaters made in America. Capacity from 30 to 200 gallons.

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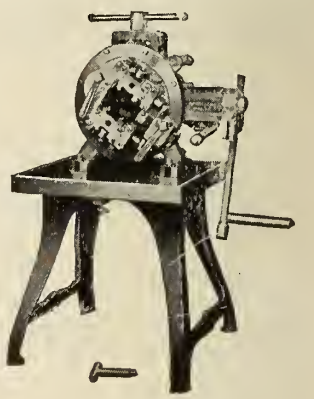
The Hotstream Heater Co. · Cleveland, Ohio

A want ad. in this paper will bring replies from all parts of Canada.



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PIPE MACHINES

Either Hand or Power

This machine cuts off and threads pipe from 1 in. to 4 in., right or left.
Threads Rods from ½ in. to 2 in., right or left.
American or Whitworth Threads.
Using the genuine Armstrong Dies.
All parts are interchangeable.
A time and labor saving machine.

Manufactured by

THE ARMSTRONG MFG. CO.

317 Knowlton Street
BRIDGEPORT, CONN.
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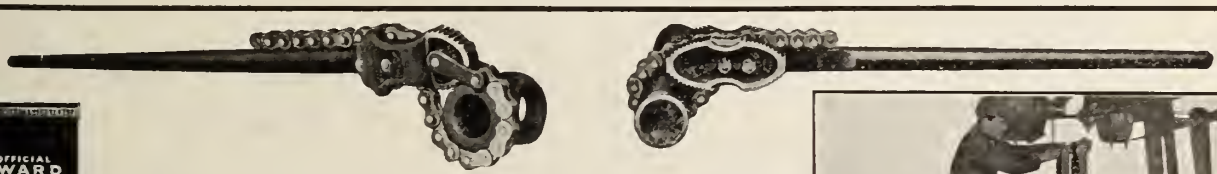
WROUGHT PIPE

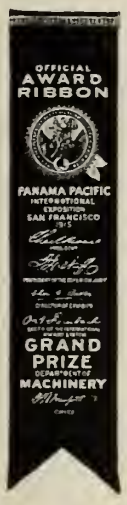
BLACK and GALVANIZED. SIZES, 1/8 IN. TO 4 IN.
All our pipe thoroughly inspected, tested to 600 lbs. hydraulic pressure and branded.

ALSO NIPPLES Black and Galvanized All Sizes.

Ask your jobber for CT Brand

CANADIAN TUBE & IRON CO., LIMITED
Montreal Works: Lachine Canal



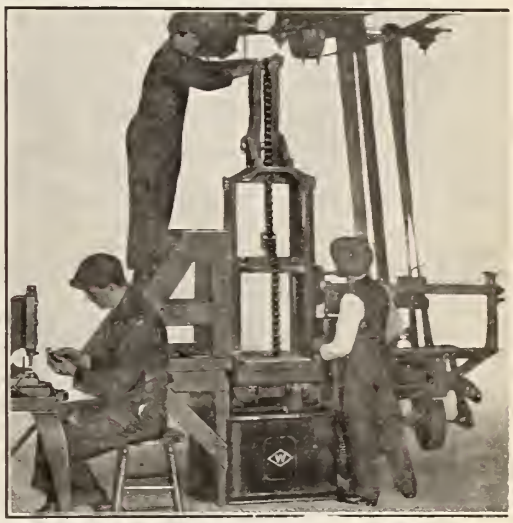


Danger to Life or Limb lurks in the hidden flaw of an untested chain. If you sell chain pipe wrenches, use them or assume responsibility for the safety of others who use them—no feature is so essential as their

DEPENDABILITY

All "Vulcan" and "Agrippa" Chain has withstood an actual test of two-thirds of its breaking strain to make certain it was flawless.

J. H. WILLIAMS & CO.
77 Richards Street BROOKLYN, N.Y. CITY
The Wrench People



Williams' Tests are unique but desirable.

Advertising is an insurance policy against forgetfulness Stopping an advertisement to save money is like stopping a clock to save time. —it compels people to think of you—Galveston News.

COLE DIRECT RETURN TRAPS

Are big fuel savers because they operate on 1-10th the steam that it takes to run a steam pump.
They work with the utmost in efficiency and reliability, and return condensation at any pressure.
Operate on roller bearings, on a fixed Fulcrum which permits of full discharge at each operation.
Mr. Steamfitter, why not get in touch with US?

GEO. W. COLE CO.
838 Dundas St., TORONTO

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Call attention to a new and valuable type of the Steamo Air Moistener, for attachment to steam risers. It is a very useful type and you should know about it.

The Steamo is also made in a variety of sizes and kinds for all purposes.

There is now no reason why all heating plants should not be designed to embrace the great advantage of humidity, or existing steam plants amplified

Descriptive matter and prices on request.

No. 2 Riser Type

The Air Moistener Co.
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Mr. "Licensed" Plumber

Bulletin No. 9

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Are you making any effort to supply the "Gas" appliance needs of your clients, and of the householders in your neighborhood?

Popular feeling has already created the demand—are you fostering same and endeavoring to supply the needs?

There is money in it.

We will help you—phone or write us.

The Consumers' Gas Co. of Toronto

12-14 Adelaide St. W. **Phone Ade. 2180**

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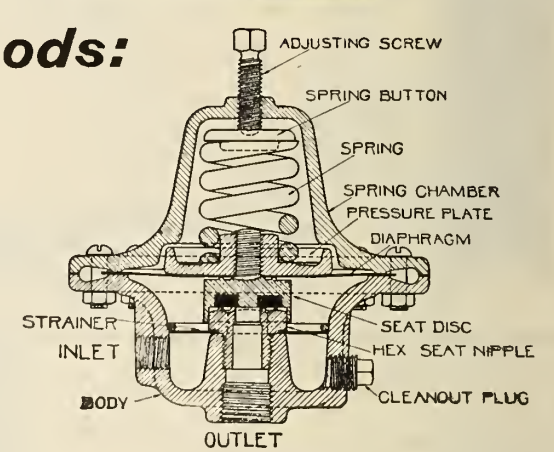
MUELLER
REGISTERED

The name on them is what gives them real value. Without a name of moral and financial responsibility you must accept goods for just what they are. With a responsible name back of them you accept them for what the name stands for. The name MUELLER stands for quality. It's your protection.



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Are for accurate, reliable and long-lasting service on cold water, hot water, steam, air, oil or gas. They will be found reliable from day to day or after standing idle a year. Try them.

H. Mueller Manufacturing Co., Limited
SARNIA, ONTARIO

Makers of High-Grade Water, Plumbing and Gas Brass Goods

S.E.

H. Mueller Mfg. Co., Ltd.
SARNIA, ONT.

Send me your Regulator catalogue and quote prices on No. 1450.

Signed .....

City Prov. .....

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Air Line Systems.
C. A. Dunham Co., Ltd., Toronto.

Air Valves.
Canadian Wolverine Co., Ltd., Chatham.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.
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Empire Brass Mfg. Co., London.
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National Equipment Co., Ltd., Toronto.

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Gurney Foundry Co., Ltd., Toronto.

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Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
National Equipment Co., Ltd., Toronto.

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Gurney Foundry Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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Honeywell Heating Specialty Co., Montreal.
James Morrison Brass Mfg. Co., Toronto.

Heaters.
Gurney Foundry Co., Ltd., Toronto.
Harris Construction Co., Ltd., Montreal.
E. S. Manny Co., Montreal.
Steel & Radiation, Ltd., Toronto.
Warden King, Ltd., Montreal.

Lead.
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Hoyt Metal Co., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.

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Mueller Mfg. Co., Sarnia.
Standard Ideal Co., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Nipples.
Canadian Wolverine Co., Ltd., Chatham.
Canadian Tube & Iron Co., Ltd., Montreal.
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Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Wallaceburg Brass Mfg. Co., Wallaceburg, Ont.
Warden King, Ltd., Montreal.

Oil Storage Systems.
National Equipment Co., Ltd., Toronto.

Packing.
Canadian Wolverine Co., Ltd., Chatham.

Pipe, Black and Galvanized.
Canadian Tube & Iron Co., Ltd., Montreal.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Steel & Radiation, Ltd., Toronto.
Steel Co. of Canada, Montreal.
Warden King, Ltd., Montreal.

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Canadian Wolverine Co., Ltd., Chatham.
James Morrison Brass Mfg. Co., Toronto.

Pipe, Soil, and Fittings.
Anthes Foundry Co., Toronto and Winnipeg.
Can. H. W. Johns-Manville Co., Ltd., Toronto.
Empire Brass Mfg. Co., London.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Warden King, Ltd., Montreal.

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Armstrong Mfg. Co., Bridgeport, Conn.
John Hall & Sons, Ltd., Brantford.
A. B. Jardine & Co., Hespeler.

Pipe and Radiator Hangers.
Beaton & Cadwell Mfg. Co., Ltd., New Britain, Conn., U.S.A.

Porcelain Ware.
Amherst Foundry Co., Amherst, N.S.
Cluff Bros., Church St., Toronto.
Galt Brass Mfg. Co., Galt.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
Standard Ideal Mfg. Co., Ltd., Port Hope.
Standard Sanitary Mfg. Co., Toronto.

Pumps.
Aylmer Pump & Scale Co., Ltd., Aylmer, Ont.
Cluff Bros., Church St., Toronto.
C. A. Dunham Co., Ltd., Toronto.
James Morrison Brass Mfg. Co., Toronto.
H. Mueller Mfg. Co., Ltd., Sarnia, Ont.
National Equipment Co., Ltd., Toronto.
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Radiators.
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Cluff Mfg. Co., Toronto.

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John Stevens & Co., Ltd., Winnipeg.

TORONTO

Type "H"

Hand-Operated Water System

YOUR reputation as a first-class, reliable plumber will be assured if you install "TORONTO" Water Systems. Our large experience in this line is at your disposal—let us assist you with your next water supply problem.

Ontario Wind Engine & Pump Co., Limited
Head Office: TORONTO
Branches: Montreal, Winnipeg, Calgary, Regina.

Keep Posted on Law

"Digest of the Mercantile Laws of Canada"

PRICE $2.50

At the recent convention held in St. John, N.B., the question of the lien law was discussed.

Every Sanitary and Heating Engineer in Canada should know a little of the laws in force in his province.

This Book contains over 1,000 subjects of interest to every business man in Canada. Write to

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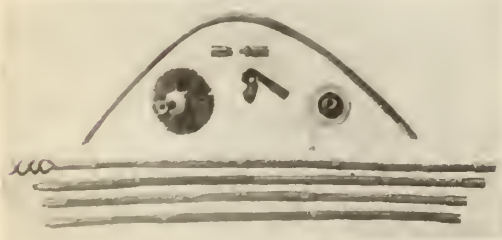
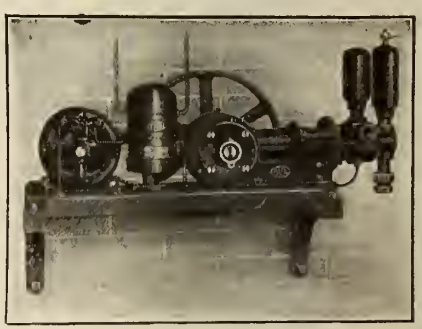
DRAIN CLEANING MACHINE
As supplied to His Majesty's Government.



Rods made of Malacca Cane, Strong and Pliable, fitted with Jointed Scraper, Screw, Rubber Plunger and Brass Brush.
ROGERS AGENCIES, 84 Victoria St., Toronto

R. O. WYNNE-ROBERTS
Consulting Engineer
310 TEMPLE BLDG., BAY STREET
TORONTO
Water Supply, Sewerage, Sewage Disposal, Civic and General Engineering Arbitrations, Investigations, Valuations, Reports, etc.

The Paul Electric Motor Pump



Every plumber and jobber should write to the Fort Wayne Engineering & Mfg. Co. (Dept. S), Fort Wayne, Indiana, and ask for Bulletin 4073, which describes this popular pump for residence service.

TWO CENTS PER WORD

You can talk across the continent for two cents per word with a WANT AD in this paper

"When writing advertisers please mention that you saw their advertisement in the SANITARY ENGINEER."

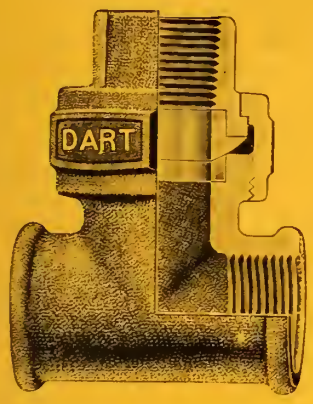


FIG. 1

For every one of these fittings used there is a saving of one T, one nipple or piece of pipe and two threads. The latter are possible leaks.

Save Time and Cut Out Leaks

These styles of **DART UNIONS** embody all the Dart Union efficiency—viz., they are bronze to bronze at the joint **(there is nothing to deteriorate)** and the heavy iron parts will not stretch or pull apart. They stay tight until deliberately loosened with a wrench, and are easily connected, whether pipes are in or out of line.

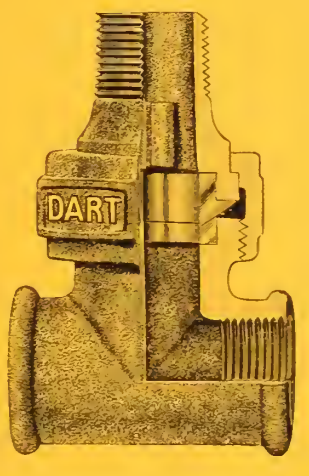
There are several fittings in one. On connecting up a range boiler, as few as two are used and possibly as high as nine, thus it may be necessary to carry 36 fittings for one job or eight for the first.

All jobbers sell them.

Dart Union Co., Ltd., Toronto, Ont.

On figure 2 you have to handle and stock one fitting instead of four. It is a real Four-in-one. Saves leaks and troubles.

FIG. 2



KERR GATE VALVES

NOW IS THE TIME to show your patriotism, and prove to yourself and others, that VALVES, made in Canada, are equal in quality and workmanship, to any made elsewhere in the World.

BREAK THE HABIT of buying foreign-made goods and get acquainted with Canadian Made valves, which you have perhaps imagined were not quite equal to the Imported variety.

This plant is at your service.
Help us keep it busy.

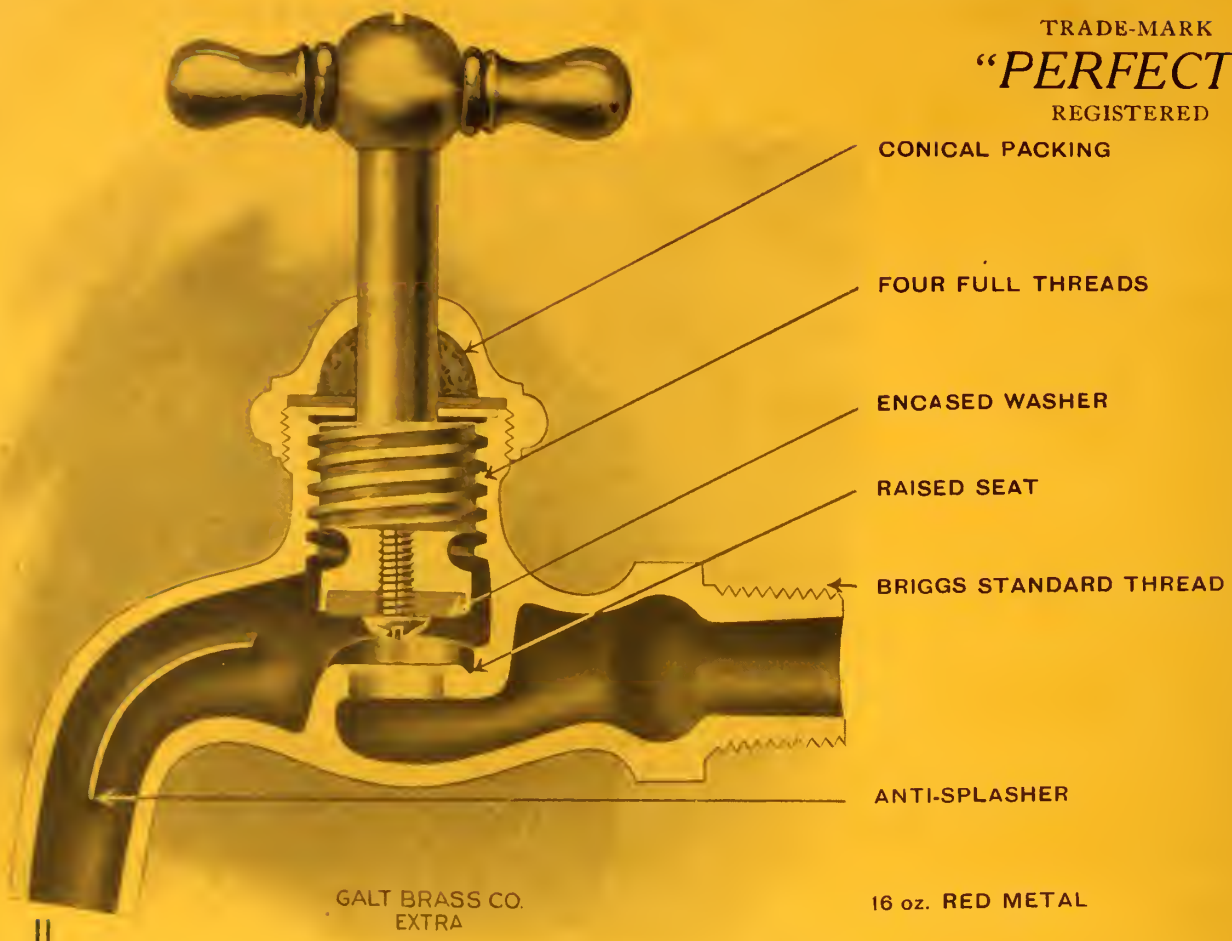
REMEMBER that every dollar spent in Canada for Canadian manufactured goods, means increased consumption of raw materials. and increased employment of Canadian labor.

Quickest possible deliveries. Consistent Prices. Best quality of goods. Write for Catalog No. 5.

The Kerr Engine Company, Limited Walkerville, Ontario

Valves and Hydrants Exclusively

TRADE-MARK
"PERFECTO"
REGISTERED



The above illustration shows, in actual size, the exact construction of all our Bibbs.

They are all Quickopening, having Double Thread on stem.

The same features are also embodied in all our Bath, Basin and Sink Cocks.

GUARANTEE

Any article of our make proving defective through inferior metal, or improper workmanship, on our part, will be replaced with TWO good ones, at NO CHARGE to you.

The Galt Brass Company, Limited

Galt, Canada